WEBVTT

1
00:00:07.710 --> 00:00:08.099
Morgan Elowe MacLeod: hi.

2
00:00:15.389 --> 00:00:25.800
Morgan Elowe MacLeod: Great well welcome everybody i'm delighted to have Anthony brown for first ITC colloquium of this semester.

3
00:00:27.330 --> 00:00:27.870
Morgan Elowe MacLeod: But.

4
00:00:29.250 --> 00:00:33.750
Morgan Elowe MacLeod: Before we get started let's talk a little bit of logistics so.

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00:00:35.100 --> 00:00:50.790
Morgan Elowe MacLeod: we're really grateful to have everyone here we're really grateful to have our speaker here, these are challenging times obviously and and so we're lucky to be able to make this space to to talk about things out of the troubles of the world.

6
00:00:51.960 --> 00:00:54.960
Morgan Elowe MacLeod: So thanks for your time and attention and.

7
00:00:56.070 --> 00:01:06.120
Morgan Elowe MacLeod: The format today is that our speaker will share some results in the first half for about 20 or 25 minutes and then.

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00:01:07.860 --> 00:01:13.980
Morgan Elowe MacLeod: The second half, will be primarily devoted to discussion.

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00:01:15.270 --> 00:01:21.120
Morgan Elowe MacLeod: And this week on is going to open that discussion and then we're hoping all of you will chime in.

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00:01:23.190 --> 00:01:45.090
Morgan Elowe MacLeod: And so what we'd like to do to facilitate that discussion is, if you have a question at any point during the talk during like the conversation just send today on a one like word one half sentence like question about.

11

00:01:46.800 --> 00:01:56.130
Morgan Elowe MacLeod: parallax is I mean I don't know and so that she has a little bit of a sense of where your question is and then we're going to try to navigate through the questions in a way that.

12
00:01:56.670 --> 00:02:06.270
Morgan Elowe MacLeod: One builds on the next, and we, we were not jumping around too much so, at any point, if you have a question just send a private chat through zoom.

13
00:02:07.980 --> 00:02:11.430
Morgan Elowe MacLeod: To Allah and then we will go from.

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00:02:13.260 --> 00:02:18.060
Morgan Elowe MacLeod: So without further ado i'll pass the MIC over.

15
00:02:18.810 --> 00:02:30.840
Ana Bonaca: Okay, so I will just give a brief introduction to Anthony it's really well, first of all i'm also very happy to see so many of your names on disco.

16
00:02:31.620 --> 00:02:38.250
Ana Bonaca: it's been a while our last meeting was on December 3 which has coincidentally, also the day of the.

17
00:02:39.150 --> 00:02:50.760
Ana Bonaca: early days early three from the guy mission, and despite the pandemic and everything else going on, it was an exciting time, especially for galactic astronomers and there was a flurry of papers coming out.

18
00:02:51.810 --> 00:03:06.330
Ana Bonaca: In the meantime, so either, it is really very exciting that today with us, we have Anthony Brown, who is the Chair of the data processing and analysis consortium of the Catholic mission it's really the driving force behind.

19
00:03:06.930 --> 00:03:24.120
Ana Bonaca: All of the sciences, has been enabled with this data so anthony's a faculty at lighten are he also spent most of his career also get a Masters and PhD there and has been a friend on the Faculty since 2001 SEC use.

20
00:03:25.290 --> 00:03:26.940
Ana Bonaca: scientific interest started but.

21
00:03:28.620 --> 00:03:41.940
Ana Bonaca: Ob associations and open clusters and then sort of as sort of direction he moved into this idea of using astrometry as as a main tool for studying these objects.

22
00:03:43.020 --> 00:03:51.270
Ana Bonaca: He has been involved with guy on for a long time kind of in various different working groups and and today he is that.

23
00:03:52.200 --> 00:04:13.230
Ana Bonaca: His role kind of overseeing managerial role or saying that the whole mission, and this has been hugely influential and Anthony has sort of pens, the guy they release papers, the second data release paper has been cited more than 4000 times and in 2018 Anthony has been.

24
00:04:15.480 --> 00:04:34.350
Ana Bonaca: awarded the vital natured top 10 people who met her in science award and last year he was also nominee for the following walls, so we that we were very excited to hear what are the news that are coming up with this new data Anthony please take it away.

25
00:04:35.580 --> 00:04:35.970
Anthony Brown: Okay.

26
00:04:36.030 --> 00:04:43.920
Anthony Brown: Thanks a lot for the Nice introduction to be a pleasure to be speaking to, and also to service as guinea pig for the new format that.

27
00:04:43.920 --> 00:04:53.520
Anthony Brown: sounds very interesting to me so let's let's hope we can make this work today so i'll give a very brief overview of guy he tree contents.

28
00:04:53.940 --> 00:05:05.610
Anthony Brown: But, of course, in the discussion we can come back to more details if you're if you want to know and then i'll give an overview first of the four papers that we put out alongside the release science papers and then.

29
00:05:07.320 --> 00:05:24.930
Anthony Brown: A few papers that I thought were interesting and want to want to highlight i'm happy to say that there's already too many papers

for me to talk about it, one colloquium so that's that's a good sign for for for guy again Okay, so in the background, you have the the.

30
00:05:26.370 --> 00:05:33.870
Anthony Brown: What is it the new sky map based on Gaia and the tree, of course, not very dramatically different from what we had for Dr to.

31
00:05:34.350 --> 00:05:44.430
Anthony Brown: But, especially if you look at the source density maps and compare them between the releases, you can really notice the here progress, so you should take some a moment to do that for yourselves.

32
00:05:45.510 --> 00:05:55.890
Anthony Brown: And sort of contents of the guy early day truly story it's really in an update only have the astrometry and the broadband for dormitory so we have 1.8 billion.

33
00:05:56.430 --> 00:06:15.210
Anthony Brown: stellar positions, about one and a half billion parallax is improper motions and then for all the stars, the brightness in the guys white light band and for again about 80% of the stars, one and a half billion, we have the colors into broad BP and rp bands and one.

34
00:06:16.380 --> 00:06:24.000
Anthony Brown: important advance in this release is also the fact that our celestial reference frame the guys with us to reference frame is now based on about 1.6 million.

35
00:06:24.510 --> 00:06:34.830
Anthony Brown: Extra galactic sources mainly quasar So this is the second time that a not a symmetric reference frame is completely in the article is completely based on on extra galactic sources.

36
00:06:36.090 --> 00:06:47.280
Anthony Brown: And just a reminder of the precision of the barrel access compared to guide year one and year two sort of thick green line is where we are now with the early day to release three.

37
00:06:47.790 --> 00:06:55.050
Anthony Brown: And you can notice the big improvement, especially at the bright and in the parallax precision on average it's about 30% better but.

38
00:06:55.830 --> 00:07:08.370

Anthony Brown: A bit more at the bright end and the yellow and red line are reminders that there is more to come so there's the year for which will be based on five and a half years of observations and then Dr five.

39
00:07:09.180 --> 00:07:15.840
Anthony Brown: If everything goes well, should be based on 10 years of data so there's still significant improvements to come.

40
00:07:16.830 --> 00:07:27.900
Anthony Brown: And this is even more dramatic in the case of the proper motions were compared to do to we now have a factor of two improvement over the most of the magnitude range of Gaia.

41
00:07:28.170 --> 00:07:33.600
Anthony Brown: And again larger improvements, at the very bright and thanks to the suppression of systematics.

42
00:07:33.990 --> 00:07:42.360
Anthony Brown: And one interesting thing to notice that in guy Dr one we had this subset of your barcode stars, where you effectively made proper motions on a 24.

43
00:07:42.960 --> 00:07:55.410
Anthony Brown: Time year 24 year time baseline and now just with Gaia your tree itself, based on a little little under three years of data, we are already as good as this 24 years baseline.

44
00:07:57.090 --> 00:08:11.580
Anthony Brown: Okay, then now I switched to the four guy collaboration papers that were put out as performance verification papers mainly intended to demonstrate the kinds of science, that you can do with this release, not as the definitive.

45
00:08:12.780 --> 00:08:22.230
Anthony Brown: works on the on the various topics, but really to provide also some guidance to to users as to how to best make use of our new data.

46
00:08:23.790 --> 00:08:35.580
Anthony Brown: So the first one is on the guy catalog of nearby stars, so this is a very precise inventory of everything that is located within 100 parsecs from the sun and this infographic.

47
00:08:36.060 --> 00:08:45.390

Anthony Brown: Just shows illustrates the enormous expansion in our knowledge, compared to what was known previously from the ground and you barker's about the precise contents of stars within.

48
00:08:46.020 --> 00:08:54.300
Anthony Brown: 100 parsecs now of course you can ask why, why did we wait until the tree the tree to do this, this could have been done with Gaia.

49
00:08:54.810 --> 00:09:04.650
Anthony Brown: Dr to as well, but there we were suffering a lot more from sources which curiously large barrel axis, so the inventory of the nearest 100 parsecs would have been.

50
00:09:05.310 --> 00:09:20.130
Anthony Brown: quite a bit less reliable, so what they did in this paper is to apply machine learning methods to classify the astra metric photo metric solutions of the year, three stars into into reliable once and less reliable once.

51
00:09:20.640 --> 00:09:28.770
Anthony Brown: And this is what you can see the top left in the HR diagram so all the bluish points are what is considered to be reliable.

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00:09:29.490 --> 00:09:38.010
Anthony Brown: Data in terms of structure for telemetry and the yellow points you can clearly see that there, there are problems with either the parallax or D for tama tree itself.

53
00:09:38.520 --> 00:09:53.700
Anthony Brown: So this paper is actually a very nice one to turn to if you're looking for guidance on how to select the best quality data from a guy in your tree or or if you're looking for ideas on how you can apply that to your specific samples, the best way to select the.

54
00:09:55.080 --> 00:10:03.870
Anthony Brown: High quality data and they give a few science examples, one of them is the find structure on the HR diagram this was also discussed with guy.

55
00:10:04.290 --> 00:10:10.350
Anthony Brown: Dr to data, but this can be done now, in much more detail with the idea tree and you see, for example, the.

56
00:10:10.800 --> 00:10:22.950

Anthony Brown: gap that was discovered by Joe at all in the around the stars a gap luminosity distribution and there's many more fine structures that can be seen now with the better barrel axis and also be better for telemetry.

57
00:10:23.940 --> 00:10:29.070
Anthony Brown: And then, in the bottom two panels, you see the example of the hades cluster which is now mapped over.

58
00:10:29.370 --> 00:10:37.170
Anthony Brown: More more or less the the whole sky so, including its its title tales, the core of course was already very well mapped but now you can really.

59
00:10:37.470 --> 00:10:46.950
Anthony Brown: do a very good job on the title deals thanks again to the proper motion improvements and those title tales nicely follow basically what you expect from.

60
00:10:47.970 --> 00:10:55.050
Anthony Brown: If you do and body and simulations of a star star cluster disrupting indie title force force field of the Milky Way.

61
00:10:56.340 --> 00:11:02.820
Anthony Brown: Okay, the second paper was on the large and small magellanic cloud, and this is an illustration.

62
00:11:03.450 --> 00:11:12.480
Anthony Brown: which was made for for outreach purposes, but it very nicely shows that we now have the kinematics map of the.

63
00:11:13.260 --> 00:11:19.170
Anthony Brown: Of the largest momentum and cloud and function of the various populations, one can find there, so you can make.

64
00:11:19.560 --> 00:11:28.530
Anthony Brown: A precise HR diagram or color magazine diagram based on the guy for telemetry and from that select, for example, very young stars, these are blue.

65
00:11:28.890 --> 00:11:38.880
Anthony Brown: Sources over here, and then the various colors indicate older age groups and for each of those you can of course study, now the kinematics with the exclusive promotions, that we have from Gaia.

66
00:11:39.180 --> 00:11:54.750
Anthony Brown: And one of the things that really comes up very prominently now is this bridge of young stars truck which i'm traveling from the SMC to the to the galaxy this was already uncovered in the Dr one data, in fact, but now it can be studied in greater detail.

67
00:11:56.220 --> 00:12:07.020
Anthony Brown: So the top left panels show the rotational velocity of the stars, as well as the radio motion in MC coordinates as a function of the various.

68
00:12:08.190 --> 00:12:17.760
Anthony Brown: stellar population, so the various age groups, and so we're really now have based on the guy promotions to sort of if you map of these two of these two galaxies.

69
00:12:19.590 --> 00:12:23.670
Anthony Brown: button then also split into into the various stellar populations.

70
00:12:24.660 --> 00:12:38.310
Anthony Brown: Also, the outskirts of the llc and SMC have been examined in this paper, this is something that many other authors have also done, of course, again, can be done better with with ED or tree, because you have a better way now of cleaning off.

71
00:12:38.970 --> 00:12:46.350
Anthony Brown: For and background stars, making use of the proper motions and barrel axes and then here, you see, in the top Rock in the bottom.

72
00:12:48.180 --> 00:12:58.590
Anthony Brown: In the bottom left the proper motion field, clearly showing how the stars are traveling along this bridge between the two galaxies demonstrating again their.

73
00:12:59.070 --> 00:13:07.830
Anthony Brown: interaction so again this paper is if you're interested in dmc and SMC, this is a good place to go to for guidance on how to make a clean selection of.

74
00:13:08.940 --> 00:13:10.920
Anthony Brown: stars that are in these galaxies.

75
00:13:13.080 --> 00:13:17.370

Anthony Brown: Now, when we were planning our papers for the.

76
00:13:18.090 --> 00:13:26.880
Anthony Brown: For the early day to live stream, one of the obvious things that came up was that we should look at the anti Center because we are, of course, improving the proper motions, but not adding.

77
00:13:27.180 --> 00:13:42.300
Anthony Brown: New radio have lost his yet in this release and in this direction, of course, you only need the proper motions, in order to study the kinematics and dynamics of the of the Milky Way because the radio motion to radio velocity is not really an important component in that direction.

78
00:13:43.350 --> 00:13:52.020
Anthony Brown: So this was done in the guy collaboration paper, led by Teresa and OSHA and you see here in the.

79
00:13:53.880 --> 00:14:04.590
Anthony Brown: Top left panels again a rotation curve split up according to various data population, so the blue are the blue and orange are young stars.

80
00:14:05.010 --> 00:14:13.770
Anthony Brown: The Brown is red clump and then older populations that are red and the Green lines, and this is compared to the H1 rotation velocity curve.

81
00:14:14.670 --> 00:14:21.150
Anthony Brown: The bottom part shows the dispersion in the html to motion of the stars and then on the the other panel shows the.

82
00:14:21.720 --> 00:14:33.720
Anthony Brown: Vertical motion of the stars and again, also the dispersion and, in particular in the if you look at the combination of the two the vertical motion as a function of the aclu to motion and you split this up in.

83
00:14:34.110 --> 00:14:43.260
Anthony Brown: Radio buttons you can see that there is a buying modality and behavior for stars that are located above and below the galactic plane where.

84
00:14:43.980 --> 00:14:51.270

Anthony Brown: Above the galactic plane, the stars tend to rotate a bit faster and move preferentially upwards, which you can also see in these.

85
00:14:51.900 --> 00:15:09.210
Anthony Brown: In these diagrams and below the galactic plane, they tend to rotate a little bit slower and preferentially move downwards, so this is an indication again of complex dynamics of the of the desk of the galaxy and they've also studied the guy Enceladus.

86
00:15:12.150 --> 00:15:19.980
Anthony Brown: For this, this split in the in the in the main sequence that was discovered guide you to where the blue part is in the HALO is.

87
00:15:20.820 --> 00:15:37.440
Anthony Brown: The remnants of the guy and sailors galaxy to merge with our galaxy sometime a billion years ago and the red bar to start to be the nc to disk and again if you split the sample according to this blue and the red sequence, and you map according to the.

88
00:15:38.670 --> 00:15:44.460
Anthony Brown: Vertical and the html to motion again and split this up into radio bins that what you can see.

89
00:15:44.790 --> 00:15:53.820
Anthony Brown: Is that the red sequences more or less truncated at about 14 killer parsecs, whereas the blue sequences in if you focus on the retrograde stars.

90
00:15:54.210 --> 00:16:04.920
Anthony Brown: You can see that extends out too much further on to about 70 kilo parsecs this here is probably an indication of this of the inside out growth of the of the galactic desk.

91
00:16:06.720 --> 00:16:07.560
Anthony Brown: Okay, then.

92
00:16:09.030 --> 00:16:12.390
Anthony Brown: The last one that that's really a.

93
00:16:13.740 --> 00:16:21.900
Anthony Brown: very powerful demonstration of the high quality of the astrology, in particular, of the proper motions and that concerns the acceleration of the solar system.

94

00:16:22.410 --> 00:16:27.540
Anthony Brown: And the acceleration that the solar system experiences as its orbits the Milky Way.

95
00:16:28.110 --> 00:16:39.210
Anthony Brown: And this is manifest as a pattern in the equator proper motion pattern and Equator so the equations, of course, we cannot expect to measure actual proper motions of the sources are too far away.

96
00:16:39.810 --> 00:16:49.770
Anthony Brown: But the accelerated motion of the sun causes of changing aberration of the positions of the quasars and that leads to an apparent proper motion which is indicated here in this in this.

97
00:16:50.670 --> 00:16:58.920
Anthony Brown: diagram and also apparent promotions point in the direction of the acceleration, which of course is expected to be close to the galactic Center.

98
00:17:00.120 --> 00:17:09.360
Anthony Brown: Now, so we used about a million quasars to make this measurement to and what you do is you basically model, the vector field of proper motions.

99
00:17:09.900 --> 00:17:19.230
Anthony Brown: With a factor circle harmonic decomposition and then you can actually measure the acceleration of the solar system to be equal to about five microseconds per year.

100
00:17:19.770 --> 00:17:29.700
Anthony Brown: which translates to two streams per meter per second squared of acceleration so it's an extremely small number which we can measure by looking at these.

101
00:17:30.060 --> 00:17:37.800
Anthony Brown: objects, all the way at the other end of the universe and accurately measuring their positions as a function of time and here you see the.

102
00:17:38.820 --> 00:17:52.200
Anthony Brown: direction in which the acceleration is pointing which is sort of slightly below left of the galactic Center so one of the components pointing in the vertical acceleration effect pointing downward.

103

00:17:53.670 --> 00:17:54.210
Anthony Brown: Okay.

104
00:17:56.100 --> 00:18:05.250
Anthony Brown: Then I switch now to a couple of papers that came out after the release, which were done by the Community, not by not by the guy collaboration.

105
00:18:06.000 --> 00:18:18.360
Anthony Brown: So the first of these is about the hubble constant so reset all took a sample of selfies that they've been working with for a long time and distinct is in fact what we're looking at as a combination.

106
00:18:18.840 --> 00:18:28.380
Anthony Brown: Of Gaia data and HST data 47 feet so with the scanning technique that they use to measure the astrology for cepheids you can actually.

107
00:18:28.800 --> 00:18:39.000
Anthony Brown: Get astrometry those as good or better than then guide us, and so you can combine the various parallax measurements, in order to investigate the value of the hubble constant.

108
00:18:39.570 --> 00:18:54.630
Anthony Brown: And wanting to have to do, of course, is to also fit for the fact that there is a pair like zero point offset which is well characterized in our case for the quizzes but for the for the brighter star, such as cepheids which are different colors you need to read the specifically.

109
00:18:55.980 --> 00:19:05.940
Anthony Brown: characterize T zero point and that's shown in this diagram which shows the contours of the sufi luminosity as a function of the parallax offset.

110
00:19:06.330 --> 00:19:15.900
Anthony Brown: And the most likely value for that leads to a horrible constant of 73 columns per second per mega bar SEC now measured at a position of about 2%.

111
00:19:16.290 --> 00:19:30.900
Anthony Brown: Which means it's again further away from the plank value in terms of significance so as nicely put in quantum magazine the we got our wish, but the cosmic crisis got to got worse or more interesting, I think.

112
00:19:31.980 --> 00:19:32.880
Anthony Brown: Okay, then.

113
00:19:34.950 --> 00:19:45.510
Anthony Brown: This is a paper that came out on the day after the release by Joe bovey and he had very cleverly noted that this solar system acceleration measurement.

114
00:19:46.080 --> 00:19:54.630
Anthony Brown: means that you can actually that we now have access to acceleration measurements absolute acceleration measurements for more than only the sun.

115
00:19:55.320 --> 00:20:04.350
Anthony Brown: And what you notice is that the if you do pulse or timing measurements, you need to account for the differential acceleration between the sun and pulsars.

116
00:20:04.860 --> 00:20:15.540
Anthony Brown: And because we know the value of the solar system acceleration in absolute terms now because its measured respected equations you can actually turn the polls are accelerations also into absolute measurements.

117
00:20:16.110 --> 00:20:28.920
Anthony Brown: And you can compare the acceleration field that you measure that way directly with a couple of popular Milky Way models So these are the various sponsors in the sample and the acceleration as predicted by the Milky Way model nicely.

118
00:20:30.360 --> 00:20:33.000
Anthony Brown: corresponds with what you see in the data.

119
00:20:33.600 --> 00:20:49.860
Anthony Brown: And by making use of the no known distance to the Center of the Milky Way from the gravity instrument again astrometry and also the proper emotional sagittarius a star, which comes from other extra metric measurements from based on field bi you can start looking at the.

120
00:20:51.240 --> 00:20:56.880
Anthony Brown: Traditional Milky Way parameters, including also the rotation curve, where you can again make use of these.

121
00:20:57.570 --> 00:21:03.390

Anthony Brown: pulsars and that shows that, as we already know of course that the rotation curve is flat.

122
00:21:03.930 --> 00:21:13.890
Anthony Brown: And so, these these measurements, of course, are not super constraining at the moment, but in the future, of course, we expect to be doing better on the solar system acceleration measurement and also.

123
00:21:14.400 --> 00:21:20.850
Anthony Brown: we're going to expect improvements in pulsar measurement so we can really start probing the acceleration fields directly this way.

124
00:21:22.920 --> 00:21:30.090
Anthony Brown: Okay, the other way to do milk or one other way to do Milky Way routers was presented in a paper by by mohan.

125
00:21:30.600 --> 00:21:40.860
Anthony Brown: And collaborators and what they did is they took the streams in the Milky Way that are in sort of an ideal place so they're not disturbed by the disk or the nmc.

126
00:21:41.400 --> 00:21:46.530
Anthony Brown: They correspond to low mass progenitors in their apple centers are within 30 kilo parsecs.

127
00:21:46.950 --> 00:21:53.850
Anthony Brown: And for those streams, you can more or less assumed that the motions of the stars should lie along the streets with the stream itself.

128
00:21:54.270 --> 00:21:59.430
Anthony Brown: The morphology represents the year the orbit and any deviation away from.

129
00:22:00.030 --> 00:22:08.370
Anthony Brown: The emotions being along the stream can then be ascribed to the reflex motion from the sun that enters into the proper motions that we observe.

130
00:22:09.000 --> 00:22:25.200
Anthony Brown: And if you didn't fit all the streams according to the criteria I just selected according to the criteria I just mentioned, you come out at these values for the parameters of the of the of the Milky Way with a rotation velocity or.

131
00:22:26.520 --> 00:22:31.920
Anthony Brown: Israel, the velocity for a song which is very comparable to that which was derived by by both of you, based on the.

132
00:22:33.990 --> 00:22:38.730
Anthony Brown: Based based on the combination of the sort of system acceleration, the other measurements.

133
00:22:39.390 --> 00:22:46.650
Anthony Brown: And the interesting thing they find is that the vertical velocity defined in this way, so measured with respect to things that are.

134
00:22:47.460 --> 00:22:57.990
Anthony Brown: Most articulate parsecs away in a low is three kilometers per second or so, which is lower than the traditional values and maybe this is an indication that there is a bulk motion.

135
00:22:58.680 --> 00:23:07.260
Anthony Brown: Between the disk of the Milky Way and the HALO something, for example, that can be expected from an interaction with the with emc.

136
00:23:10.260 --> 00:23:14.760
Anthony Brown: and continuing on the on the streams, so this is work that was done.

137
00:23:15.150 --> 00:23:24.450
Anthony Brown: By the by the same group for led by Rigoberta in this case, and these are new detections as well as known streams done with Gaia EDF tree.

138
00:23:24.720 --> 00:23:31.770
Anthony Brown: So they have two samples between three and 12 parsecs and also between 10 and 30 kilo parsecs and especially in this distance range.

139
00:23:32.070 --> 00:23:41.790
Anthony Brown: They find quite a number of new streams, which again is testament to the increase the quality of the proper motions and that can be very well seen in this.

140
00:23:42.510 --> 00:23:54.180
Anthony Brown: plot where they show the proper motion a vector diagram for Dr to or direct points ED or tree or the blue points, and you can

clearly see the title distribution, so the better quality of the promotions.

141
00:23:54.690 --> 00:24:03.090
Anthony Brown: and also in there, looking for the streams they fit in fact stream models, including also the color magnitude diagram.

142
00:24:03.510 --> 00:24:16.050
Anthony Brown: And, of course, they derive a predicted distance along the stream and if you compare that to the parallax is again, you see a tighter distribution in the blue than in the red point so again illustrating the increased quality.

143
00:24:17.520 --> 00:24:26.010
Anthony Brown: Now, one of the things in this in these diagrams is that they show associations between the streams and possible progenitors, for example, the.

144
00:24:26.460 --> 00:24:41.670
Anthony Brown: symbol tool stream over here is associated with the Omega sentence, there was another work that was done also based on the Dr to, and there are a number of other associations that they can make now between the streams themselves and the progenitors of the of the streams.

145
00:24:42.660 --> 00:24:43.350
Ana Bonaca: Now, this was.

146
00:24:44.340 --> 00:24:45.990
Anthony Brown: Just thanks, this was.

147
00:24:46.830 --> 00:24:51.060
Anthony Brown: also done in this work by led by by Anna, so this is.

148
00:24:51.210 --> 00:24:57.060
Anthony Brown: partly based on the also on the age tree survey and combined in combination with Gaia and ED or three.

149
00:24:57.960 --> 00:25:07.020
Anthony Brown: were again they, in this case, they make a distinction between the progenitor of the stream itself sort of parent body of the stream.

150
00:25:07.500 --> 00:25:27.240

Anthony Brown: And then you can also try to in in this case in the emails that space also try to identify not only the Sierra club your clusters that are associated with a particular stream, but you can go one step further and if you examine the background stars, where you can identify the.

151
00:25:28.560 --> 00:25:35.640
Anthony Brown: Milky Way sort of sort of this satellite galaxies that were merging with the Milky Way in the past, including, for example, Guy instead of this.

152
00:25:36.150 --> 00:25:40.020
Anthony Brown: And so, then you can identify not only the stream, with a particular.

153
00:25:40.530 --> 00:25:50.130
Anthony Brown: parent body progenitor, but these progenitors done again can be associated with the hosts Milky way's to or the host galaxies that brought them in to the Milky Way.

154
00:25:50.460 --> 00:26:00.000
Anthony Brown: So we can really start piecing together quite comprehensive picture now of how the HALO of our galaxy and was assembled over the course of time.

155
00:26:00.450 --> 00:26:13.650
Anthony Brown: Of course, this was one of the big promises of Gaia and many of these things have been done, partly already with with Dr to, but now, what did much better promotions have to treat this can really be done in much greater detail.

156
00:26:15.000 --> 00:26:23.880
Anthony Brown: Okay, then the last example is a different topic, so this is about the famous double cluster H and Guy Firstly I.

157
00:26:24.870 --> 00:26:34.680
Anthony Brown: And here, you see a straight up a selection of sources from the region on the sky around this cluster and you can very easily spotted in the simply in the stock counts of Gaia your tree.

158
00:26:35.970 --> 00:26:47.760
Anthony Brown: And this was examined in detail by d'alessandro and collaborators and they noticed a lot of Sub clustering in the area around the.

159

00:26:48.510 --> 00:27:00.540
Anthony Brown: agent K Percy I, and this is also This is shown here in the form of this density maps of the double cluster sits here in the middle, but there's clearly a lot of associated structure in a wider region around it.

160
00:27:01.020 --> 00:27:10.830
Anthony Brown: And, in fact, if you extract a few subtract all the dense concentrations of stars and you then look at the distribution of the remaining stars associated with the.

161
00:27:11.220 --> 00:27:18.870
Anthony Brown: With this overall cluster environment, it very much looks like a king profile, so what they're proposing is that what we're seeing here.

162
00:27:19.110 --> 00:27:25.650
Anthony Brown: is in fact the ongoing process of the hierarchical assembly of a much larger cluster so we start with.

163
00:27:26.070 --> 00:27:33.900
Anthony Brown: The star formation in a large region, which itself is clustered but then over the course of time, these things merge into what could be like a small.

164
00:27:34.260 --> 00:27:44.310
Anthony Brown: globular cluster or something, and this is also they support this in this paper with simulations, but of course there's probably quite a lot of details still to be sorted out on this on this topic.

165
00:27:45.390 --> 00:27:52.350
Anthony Brown: Okay, then, just to end a teaser for for next year, when we will bring out the guy a directory.

166
00:27:52.740 --> 00:28:01.890
Anthony Brown: So, Dr tree will contain not new astrology and for dormitory, but it will can contain all kinds of other data products that have not been put out yet so This includes.

167
00:28:02.280 --> 00:28:08.610
Anthony Brown: The radio velocities but also things like the binary star catalog variable stars as a physical parameters of the stars.

168
00:28:08.970 --> 00:28:17.070

Anthony Brown: And also spectra based on the blue and read prison for doctors and here you see examples of quasar spectra.

169
00:28:18.030 --> 00:28:28.350
Anthony Brown: In their restaurant wavelength, and they are sorted, according to the loop back time and, of course, with longer look at times you start to compress those.

170
00:28:28.800 --> 00:28:37.920
Anthony Brown: spectra observed in the in the optical when you convert them to their restaurant wavelengths and you can clearly see a couple of the prominent emission lines.

171
00:28:38.280 --> 00:28:51.570
Anthony Brown: And again, this is just a taster of the kinds of things that you will have as part of the arteries of course not only quasars but we expect to put out many, many spectra for four stars and all kinds of other sources so.

172
00:28:53.220 --> 00:28:53.850
Anthony Brown: i'll stop here.

173
00:29:00.480 --> 00:29:01.020
Morgan Elowe MacLeod: Thank you.

174
00:29:03.480 --> 00:29:04.770
Ana Bonaca: very comprehensive.

175
00:29:05.970 --> 00:29:06.960
Morgan Elowe MacLeod: So, as we.

176
00:29:07.110 --> 00:29:15.000
Morgan Elowe MacLeod: proceed remember that if you have questions just send a word or two to Anna show.

177
00:29:16.200 --> 00:29:18.270
Morgan Elowe MacLeod: column you when we get that.

178
00:29:20.550 --> 00:29:29.670
Ana Bonaca: Yes, that's a good reminder and Anthony should left us with a number of possible leads to kind of continue the discussion.

179
00:29:30.870 --> 00:29:33.300

Ana Bonaca: But I would like to start with.

180
00:29:34.410 --> 00:29:48.300
Ana Bonaca: What appears to be a unique aspect of this data release I feel like in a way it's a it's a beta release that was the easiest to prepare for because we're kind of we're aware of what kind of data, like.

181
00:29:49.560 --> 00:29:57.690
Ana Bonaca: We are going to get it was just going to be more precise than in the article and it's at least here at the CFO and other a number of people who already have.

182
00:29:58.230 --> 00:30:04.710
Ana Bonaca: Their favorite exoplanet co stars already have here we'd like trade desk man that could use better prayer lexus or in.

183
00:30:05.130 --> 00:30:11.730
Ana Bonaca: My case the story of the HALO so we kind of all have our favorite types of objects to fall off on and.

184
00:30:12.270 --> 00:30:29.670
Ana Bonaca: I want to Anthony could ask you what was your favorite topic, what is the thing you first look at the given that you can have so selflessly highlighter everyone else's where I want to give you the chance to kind of saying like soda soda fun stuff you got out of this data set.

185
00:30:29.730 --> 00:30:43.170
Anthony Brown: Is yeah Unfortunately, so far, not have haven't really had a chance to to dig into it, there was there was just too many, too many things to do, I did define a couple of projects with.

186
00:30:44.190 --> 00:30:48.240
Anthony Brown: With bachelor and master students that are starting up soon.

187
00:30:49.050 --> 00:30:59.130
Anthony Brown: So, and one master student who was already working with Dr to data on the on where we're going to try to redo the measurement of the rotation of empty one, because I think I think it's.

188
00:30:59.490 --> 00:31:09.210
Anthony Brown: spectacular that you can actually do that from 2 million light years distance and so she's working on on a trying to improve the identification of isolated.

189
00:31:09.840 --> 00:31:18.210
Anthony Brown: starts with good quality astrometry and then we do a measurement again and then with the bachelor students there's various topics and the.

190
00:31:18.720 --> 00:31:34.890
Anthony Brown: Find structure on the HR diagrams one of them is going to look into that too, I mean they didn't do much on it in the in the paper, so we can go further with that one, I think that that will be interesting to see what we find them, whether we can find any kind of explanation for it.

191
00:31:36.570 --> 00:31:51.990
Anthony Brown: White binaries was another topic now Curry nobody has already put out a paper, but actually that's a fantastic basis for the students to start analyzing courses many things that one can do it, I have not been really discussed yet in the in the paper.

192
00:31:53.730 --> 00:32:04.560
Anthony Brown: The the I was I have written a review last year and then, when I dug into the whiteboard story that's something that interested me and one of the things I want to look at.

193
00:32:06.000 --> 00:32:16.350
Anthony Brown: Again with a better student is the difference between the whiteboard sequence that you see in the field, and when you look at open clusters and combine the whiteboard sequences to see what we can learn.

194
00:32:17.070 --> 00:32:27.060
Anthony Brown: From that so yeah there's there's plenty of things that that are set in motion, but personally I have not not yet had time to look into.

195
00:32:28.410 --> 00:32:31.110
Anthony Brown: into these into the data in detail in any case.

196
00:32:32.010 --> 00:32:33.000
Ana Bonaca: Is by proxy.

197
00:32:33.930 --> 00:32:34.350
Yes.

198
00:32:36.030 --> 00:32:41.430

Ana Bonaca: Okay i'll pass it on to Charlie Charlie you can go ahead and unmute and ask your question.

199
00:32:42.780 --> 00:32:44.280
Charles Conroy: Sir yeah great talk Anthony.

200
00:32:45.720 --> 00:32:56.100
Charles Conroy: Was it was kind of this is kind of a technical question, but I just was wondering, you know as you say, with the full Dr three release when it comes out we'll have a lot of really new data products that we haven't seen before.

201
00:32:57.570 --> 00:33:01.920
Charles Conroy: Is there any plan or and, if not there's not a plan can I encourage it, though.

202
00:33:02.670 --> 00:33:15.060
Charles Conroy: to release of the Community, a very small subset of data that we can you know use to learn how to manipulate this data before it comes out because you know getting a specter as a lot more complicated in photography so it might take time for.

203
00:33:15.300 --> 00:33:15.780
us.

204
00:33:17.970 --> 00:33:24.630
Anthony Brown: yeah we don't know there's no there's no plan to do that, I can we have we have discussed it.

205
00:33:24.660 --> 00:33:29.730
Anthony Brown: In the past, and certainly for example in the spectrum, we will be putting out a tool also.

206
00:33:29.730 --> 00:33:39.090
Anthony Brown: To to deal with them, because they will come in a representation that is non standard in the form of basis function functions under coefficients.

207
00:33:40.170 --> 00:33:49.800
Anthony Brown: But just to allow you to to manipulate that and also generate a few, if you prefer that sample versions of the spectral rather than their representation that we we give.

208
00:33:51.090 --> 00:33:57.030

Anthony Brown: But yeah we have we don't get have plans to provide samples.

209
00:33:59.160 --> 00:34:10.710
Anthony Brown: I would encourage you to send messages also to the guy help desk if you if you really want to do that, I can certainly bring it up again and deepak to see if we can do something.

210
00:34:12.390 --> 00:34:13.080
Charles Conroy: Okay, thanks.

211
00:34:25.350 --> 00:34:35.820
Ana Bonaca: So competing on this sort of plan, I had, I noticed that, on the on the first slide the curves you you showed up the expected precision, there was the beer five.

212
00:34:35.940 --> 00:34:38.670
Anthony Brown: And I think you mentioned that there was, like the.

213
00:34:38.820 --> 00:34:39.540
10 year.

214
00:34:40.920 --> 00:34:44.700
Ana Bonaca: theta so Is this the plan going forward that.

215
00:34:45.750 --> 00:34:54.150
Ana Bonaca: they're like, therefore, will be the status set for the five year data, and then there will be no intervening datasets between the five and 10 years later.

216
00:34:54.270 --> 00:35:09.990
Anthony Brown: Yes, the reason is that the so the the mission will end in 2025 and we still have to get formal approval to really go on until that time, but that we know that that will definitely be the end because then we run out of.

217
00:35:10.950 --> 00:35:27.660
Anthony Brown: The micro repulsion fuel and can no longer continue but that more or less coincides with the time of Dr for so then there's no point in doing anything in between, we just go straight ahead and reduce still 10 years after that.

218
00:35:30.420 --> 00:35:42.180

Ana Bonaca: access and this went to like since we are talking about the data is invaded contact guys are very unique mission all saying the sense that.

219
00:35:43.710 --> 00:35:46.500
Ana Bonaca: The data becomes openly available.

220
00:35:47.850 --> 00:35:51.690
Ana Bonaca: it's not like proprietary to the collaboration beforehand and.

221
00:35:52.920 --> 00:35:57.030
Ana Bonaca: You know way Sir serves as a model mission for this open science.

222
00:35:58.350 --> 00:36:00.930
Ana Bonaca: approach and so order.

223
00:36:02.580 --> 00:36:12.510
Ana Bonaca: As as to give us a little bit more instead of kind of how that came to be is a can imagine a deuce is not an easy decision to convince.

224
00:36:13.770 --> 00:36:22.080
Ana Bonaca: people to work on on on a mission and and then kind of just let it be open open linear way.

225
00:36:22.110 --> 00:36:24.300
Ana Bonaca: yeah anyone not having kind of a head start.

226
00:36:25.260 --> 00:36:25.650
Yes.

227
00:36:26.850 --> 00:36:35.220
Anthony Brown: So there's quite a long history behind that it's actually something that was also done for for hip Marcos now for a purpose, there was.

228
00:36:35.820 --> 00:36:45.540
Anthony Brown: A period of a year, where people who had originally proposed, which stars to observe got the data and only after that the catalog was published.

229

00:36:46.500 --> 00:37:03.030
Anthony Brown: But this was only for the proposers of the of those programs is meant that people in the consortium in fact had no access to the data in that during the year unless they happen to be on one of those teams, so it was in fact even even worse than we have now, if you, if you like.

230
00:37:04.080 --> 00:37:08.460
Anthony Brown: So already in that time there was this concept of there is no.

231
00:37:08.970 --> 00:37:16.830
Anthony Brown: Other than for the original proposal teams, there is no proprietary period for the consortium that actually did the data processing, of course, there was overlap between them.

232
00:37:17.430 --> 00:37:35.190
Anthony Brown: And so it became public then immediately after that year in 97, so I think there was the that was from the get go the idea was to have it as an open missions, or so, to make things immediately public without proprietary period.

233
00:37:36.330 --> 00:37:45.180
Anthony Brown: we've had many more longer discussions on whether we should do intermediate data releases or not, there were people strongly against putting out.

234
00:37:45.930 --> 00:37:54.240
Anthony Brown: preliminary data, this was also something that was not done with hypocrisy, the only produced one catalog and luckily.

235
00:37:54.930 --> 00:38:07.380
Anthony Brown: That argument was one in favor of those and said no, we should put out a preliminary version so, otherwise we would still be waiting for for the guy a catalog right oh so now, I did the.

236
00:38:08.520 --> 00:38:18.810
Anthony Brown: sort of decision on not making a proprietary in some sense was easy and it's also actually in the official management plan that science management ISA requires.

237
00:38:19.740 --> 00:38:29.580
Anthony Brown: But it's not necessarily a popular thing with everyone in the back or in or in Europe, because there are clear drawbacks, of course, when you when you don't have a proprietary period.

238
00:38:31.410 --> 00:38:37.200
Anthony Brown: And i'm i'm not sure this will ever be repeated, I i'm afraid.

239
00:38:38.280 --> 00:38:50.100
Anthony Brown: If I agree, I think it's a great model I think we've profited enormously from it, but there are also clear disadvantages for those who are actually working on today to proceed.

240
00:38:52.050 --> 00:38:59.160
Ana Bonaca: Yes, for sure, well, thank you for being the champion of this model we surely have benefited a lot.

241
00:39:00.300 --> 00:39:02.940
Ana Bonaca: More again, I had a follow up question.

242
00:39:03.960 --> 00:39:14.160
Morgan Elowe MacLeod: yeah I was wondering just hearing you talk a little bit about like the time between Dr four and Dr five and then obviously beyond.

243
00:39:15.480 --> 00:39:16.830
Morgan Elowe MacLeod: How does the.

244
00:39:19.140 --> 00:39:22.680
Morgan Elowe MacLeod: As the spacing between the releases gets longer.

245
00:39:24.120 --> 00:39:36.330
Morgan Elowe MacLeod: How does the how how what would that mean for like the human side of the data processing consortium, and what happens to the team as those transitions happen and beyond.

246
00:39:37.500 --> 00:39:43.470
Morgan Elowe MacLeod: How do you assess working, especially in concert with with this.

247
00:39:44.700 --> 00:39:51.990
Morgan Elowe MacLeod: sort of open model that that the team has adopted to very much to the Community benefit yeah.

248
00:39:53.460 --> 00:40:01.740
Anthony Brown: Well, we actually had a deepak executive discussion on this topic today on our longer term planning and one of the things that.

249
00:40:02.160 --> 00:40:10.320
Anthony Brown: Indeed, we worry about is the motivation of people, how are we going to keep people happy to continue working on on guy because you can.

250
00:40:11.070 --> 00:40:18.720
Anthony Brown: What you can see from the way the releases have developed that it will still be quite some time before Dr five is there.

251
00:40:19.320 --> 00:40:39.810
Anthony Brown: And for of course also facing increasing competition from other surveys and admissions that need funding, not only with an ISA but also outside and there are you know deepak Members who are starting to get involved in order surveys so it's something where we're discussing.

252
00:40:40.830 --> 00:40:44.490
Anthony Brown: and motivation is is an important aspect there yeah and then.

253
00:40:46.350 --> 00:40:48.270
Anthony Brown: We might have to think about.

254
00:40:49.410 --> 00:41:00.900
Anthony Brown: other ways of doing releases or other way, you know or things like being a little bit more relaxed with the data policies, etc, in order to make sure people are motivated to.

255
00:41:01.500 --> 00:41:11.760
Anthony Brown: To continue working on one guy but that's that's something that will, for the for for the moment, this is not going to have any consequences, but in the long term, we need to, we need to keep an eye on this.

256
00:41:12.570 --> 00:41:28.470
Morgan Elowe MacLeod: yeah and it's interesting because I mean, I think it really relates to the field as a whole and how we collectively choose to pursue her science, because I, at least, see the team's decisions and it's like breaking a new.

257
00:41:29.610 --> 00:41:32.340
Morgan Elowe MacLeod: territory for astronomy, in particular, but.

258
00:41:34.500 --> 00:41:41.730

Morgan Elowe MacLeod: yeah we so all of this is is uncharted for our field, at least, and I think there's a lot.

259
00:41:41.970 --> 00:41:42.510
Anthony Brown: I think.

260
00:41:42.570 --> 00:41:43.800
The the.

261
00:41:45.420 --> 00:41:47.970
Anthony Brown: yeah I mean this has been discussed in in many.

262
00:41:49.470 --> 00:41:59.670
Anthony Brown: For for many different reasons, of course, but the how how you build up a career in astronomy is one of the central questions here, you know for for keeping people motivated because.

263
00:42:00.690 --> 00:42:08.250
Anthony Brown: It is it is you know, there are plenty of dieback Members who managed to keep up in a good publication track record, but not everyone.

264
00:42:08.940 --> 00:42:29.460
Anthony Brown: can do that for for various reasons, but you still need two people to do the work, but then it's very difficult to make a career because we're still tend to look primarily at science output, rather than have you contributed to a particular mission or or data collection, or whatever.

265
00:42:30.840 --> 00:42:33.420
Anthony Brown: yeah that but that's very hard to.

266
00:42:35.040 --> 00:42:40.050
Anthony Brown: Change so we're certainly also looking at other ways of keeping up motivation.

267
00:42:42.390 --> 00:42:43.920
Morgan Elowe MacLeod: really interesting thanks.

268
00:42:45.900 --> 00:42:49.320
Ana Bonaca: Interesting switching gears a little bit or.

269
00:42:51.120 --> 00:42:55.140

Ana Bonaca: phil had a question about I think that the flies you're showing here that.

270
00:42:55.230 --> 00:43:00.570
Ana Bonaca: might actually keep some of the people are busy and me to continue pressing on.

271
00:43:02.910 --> 00:43:05.100
Ana Bonaca: Can you go ahead and ask the question.

272
00:43:05.340 --> 00:43:15.360
Phillip Cargile: yeah definitely um so great talk um, I was interested in the Brighton of this plot because there's a lot of benchmark stars out there that fall in the Brighton.

273
00:43:15.810 --> 00:43:32.610
Phillip Cargile: And there's this uptick in person and worsening precision in the parallax is at the Brighton um I also noticed that it's not in the predictions from Dr for Dr five so what's the source of that uptick and then also how did, how is it expected to be removed in the future data releases.

274
00:43:33.330 --> 00:43:33.630
Okay.

275
00:43:35.100 --> 00:43:35.790
Anthony Brown: So.

276
00:43:37.080 --> 00:43:50.100
Anthony Brown: You can notice that there's a clear difference between below 11 and above 11 magnitudes, and so what happens here below magnitude 11 is that the images on board start to get saturated.

277
00:43:50.790 --> 00:44:00.660
Anthony Brown: And what we do, there is, we cut down on the integration time by essentially blocking the built up electrons before a certain amount of.

278
00:44:01.230 --> 00:44:06.240
Anthony Brown: lines in the CCD and an audio integrating over the rest of it and.

279
00:44:07.050 --> 00:44:21.960

Anthony Brown: Discussing down increases in severity when you go to brighter and brighter star so for the very brightest stars we're actually having like a two milliseconds integration something ridiculously short but then it's already causing saturation issues.

280
00:44:23.340 --> 00:44:30.570
Anthony Brown: And this means that for every interval and magnitude, where we have these different gates activated.

281
00:44:31.500 --> 00:44:47.400
Anthony Brown: You have effectively a different instrument because you're using only part of the CCD has different sensitivity it has slightly different optics but it's all important when you're talking about micro second level astrometry and there's also means that for those.

282
00:44:48.450 --> 00:44:54.540
Anthony Brown: magnitude intervals, for example, we have to do actually a separate calibration of the attitude of the spacecraft.

283
00:44:55.260 --> 00:45:01.020
Anthony Brown: But at the same time, we have left stars to do the calibration with because there's less stars at the year at the bright end.

284
00:45:01.530 --> 00:45:09.450
Anthony Brown: And then the other thing is that you have that with all these different effectively different instruments coming in at the bright and you also have to tie them all together.

285
00:45:10.050 --> 00:45:19.380
Anthony Brown: So you have to have enough stars that were observed in different settings and luckily the onboard magnitude estimate has an error on it so sometimes the star.

286
00:45:19.830 --> 00:45:29.790
Anthony Brown: is observed one gates, I think, sometimes for the other, so there is this overlap, but these things make the calibration at the bright and very difficult so it's it's it's from the from the point of doing the actual.

287
00:45:31.200 --> 00:45:37.650
Anthony Brown: fitting of the image with a pss where the pss model is a bit difficult to derive very accurately at the bright and.

288
00:45:38.490 --> 00:45:47.040

Anthony Brown: it's treating the saturated images is tricky and then it then you have all the other things coming in, like the various calibration.

289
00:45:47.730 --> 00:46:01.980
Anthony Brown: models that you need for a different instrument settings different attitude, etc, so that is why the systematic here is much more important and very bright and it's just it's a signal that the saturation becomes really a big problem.

290
00:46:03.120 --> 00:46:14.610
Anthony Brown: Now for for the very brightest stars so naked eye stars, we are doing a special observations, where we actually do stars are not necessarily automatically detected, because the.

291
00:46:15.210 --> 00:46:27.990
Anthony Brown: images are so saturated that it looks like an extended object to the onboard system and it just rejected, so we tell them we tell guy we know there's a star passing because we have Marcus information on it so just take the data.

292
00:46:29.340 --> 00:46:39.750
Anthony Brown: And for those stars, we have there's two groups stars, where we just take a more or less a 2d image and they they can be handled more or less in our current pipelines.

293
00:46:40.260 --> 00:46:48.330
Anthony Brown: And the other ones are even the really bright stars like serious you actually need to patch together several windows along the wings of the pss.

294
00:46:49.020 --> 00:46:52.050
Anthony Brown: So that requires a special sequence of observations, those are also done.

295
00:46:52.500 --> 00:47:02.100
Anthony Brown: And, but for those stars, who are now looking into not not using the core of the psl to reduce the data, but really looking at the Spikes which are probably good enough to do the astrometry.

296
00:47:02.880 --> 00:47:12.870
Anthony Brown: But that's an offline process, which will take a while, but the yeah and the hard work will be in getting down the systematics.

297
00:47:13.350 --> 00:47:22.410

Anthony Brown: So, making sure that our bsf models are really super accurate, that we can really deal well with saturated images, but also things like the effects of.

298
00:47:23.040 --> 00:47:27.840
Anthony Brown: Georgia inefficiency might at some point start playing a role we've been lucky so far to sign has been nice to Gaia.

299
00:47:28.200 --> 00:47:35.250
Anthony Brown: So the radiation damage is much less than we expected, but if we go on for the full 10 years it will play a role so that's that's an additional.

300
00:47:36.060 --> 00:47:43.260
Anthony Brown: factor in there, so it also makes it very hard for us to predict exactly what will happen so we usually just put a floor in there and that's it.

301
00:47:44.580 --> 00:47:45.240
Phillip Cargile: Thank you very much.

302
00:47:47.130 --> 00:47:47.610
Ana Bonaca: again.

303
00:47:48.360 --> 00:47:53.220
Morgan Elowe MacLeod: This you have follow up yeah, this is a really quick follow up I think we've answered most of it but.

304
00:47:55.020 --> 00:48:00.180
Morgan Elowe MacLeod: I was just kind of curious what would be say were to design, like the.

305
00:48:01.260 --> 00:48:09.930
Morgan Elowe MacLeod: that the tests of Gaia like Gaia for the very brightest stars, what would that take and and would that.

306
00:48:11.310 --> 00:48:22.500
Morgan Elowe MacLeod: Like what would that instrument look like, and you know I just sort of I honestly i'm aware of this and thinking about like the distance to beetlejuice, for example.

307
00:48:22.560 --> 00:48:33.060

Morgan Elowe MacLeod: But I also kind of childishly when I first downloaded Dr to I really wanted to make a 3D map of the constellations and that of course I realized, all of this.

308
00:48:35.070 --> 00:48:41.550
Morgan Elowe MacLeod: These things which you know we know as astronomers Okay, the stars are saturated that sort of thing but yeah I don't know.

309
00:48:42.210 --> 00:48:43.020
Anthony Brown: I think.

310
00:48:44.280 --> 00:49:00.000
Anthony Brown: Smaller instruments that focuses are really undoing the bright stars, the problem comes from wanting to have the dynamic range between magnitudes six and 20 with the same detector that that that's just or maybe you could come up with.

311
00:49:01.560 --> 00:49:12.330
Anthony Brown: with something that has a separate focal plane for for the bright stars where where you make sure that the detectors telescope combinations match to the brightness of the stars.

312
00:49:13.290 --> 00:49:20.370
Anthony Brown: But yeah that's it's not a very creative idea, but I don't I don't see what else one could one could do I mean.

313
00:49:20.520 --> 00:49:22.920
Morgan Elowe MacLeod: To be clear, I see why you made the choices.

314
00:49:23.100 --> 00:49:23.580
Morgan Elowe MacLeod: yeah.

315
00:49:24.120 --> 00:49:27.600
Anthony Brown: The design, but don't take a question that.

316
00:49:29.130 --> 00:49:33.000
Morgan Elowe MacLeod: Would that be inexpensive instrument like mini guy.

317
00:49:33.450 --> 00:49:33.990
Anthony Brown: No.

318
00:49:34.050 --> 00:49:34.890
Anthony Brown: I mean it's been.

319
00:49:35.070 --> 00:49:43.710
Anthony Brown: it's been done before right Marcos you could you could make a version of that, I mean well it won't be very cheap but.

320
00:49:44.790 --> 00:50:01.920
Anthony Brown: You can do it as much smaller mission in fact the the Japanese have a spacecraft they build spacecraft called nano just mean which had only five centimeter mirrors and was actually going to do a very bright stars, but in the end it never happened.

321
00:50:03.270 --> 00:50:07.260
Anthony Brown: But yeah something like that you could you could do a barcode type.

322
00:50:08.340 --> 00:50:15.510
Anthony Brown: Satellite with maybe even smaller aperture has done a purpose itself just focusing on the very, very bright stars yeah.

323
00:50:17.970 --> 00:50:19.530
Ana Bonaca: it's really it's just saying.

324
00:50:20.640 --> 00:50:32.280
Ana Bonaca: You have a Christian I guess i'm more of a different types of targets your i'm sorry guys so rosy, do you want to go have a good question yeah Thank you.

325
00:50:32.520 --> 00:50:40.140
Razieh Emami Meibody: Thank you so much for a fascinating it's hard actually have a question regarding to the pay period that's you said it just.

326
00:50:40.410 --> 00:50:51.240
Razieh Emami Meibody: came up tennis tangibly fun right to be there for our station pronunciation and my actually my question is that I just make we looked at the abstract, of the paper I seems like that are saying.

327
00:50:51.600 --> 00:50:55.530
Razieh Emami Meibody: Actually, this cluster that is just like getting acclimated to the galactic tease.

328
00:50:55.800 --> 00:51:09.270

Razieh Emami Meibody: seems to have have actually solo metal etc, and the age of 20 mega year actually so I was wondering, is any actually clearly reason why all of the stars on that last day that are getting treated.

329
00:51:09.480 --> 00:51:21.690
Razieh Emami Meibody: must have almost the same as a city, in other words, I can slack on that we have a bunch of these different actually stopped last as that could be just you know because of the acceleration to water Center.

330
00:51:21.900 --> 00:51:36.630
Razieh Emami Meibody: Is this any possibility that you could have a mixture of different pieces over stars because luxury or just substantially different Leslie city and what could be the source of parks actually visitor to our dispenser.

331
00:51:38.280 --> 00:51:44.760
Anthony Brown: Well, I think the idea here is that these are very young stars, so these clusters have only formed recently.

332
00:51:45.240 --> 00:51:50.400
Anthony Brown: And that they're looked what they're proposing is that we're looking at a larger star from a region.

333
00:51:51.240 --> 00:52:03.510
Anthony Brown: where you have several centers of sort of star formation or you have a large concentration of young stars, but surrounded by also a sort of HALO have more diffuse the spread of young stars.

334
00:52:04.020 --> 00:52:11.220
Anthony Brown: And the idea is that so it's not something that merged recently with our with our galaxy it formed there.

335
00:52:11.760 --> 00:52:22.800
Anthony Brown: But now, all these different clusters are starting to melt together starting to merge together into a larger system so that's also why they pointed out the fact that if you remove the.

336
00:52:24.240 --> 00:52:39.360
Anthony Brown: The concentrations, these are the white points in this light profile, then what you're left with is something that looks very much like the profile of a globular cluster a small globular cluster, so I think what the idea is that we're really looking at the.

337
00:52:40.410 --> 00:52:53.940

Anthony Brown: formation process of a larger system, which consists of Sub structured smaller pieces, which then merge together over a fairly short amount of time of the next I don't know couple of hundred million years or so.

338
00:52:54.750 --> 00:53:02.340
Razieh Emami Meibody: He is known as the follow up on that that's that's exactly my point that start getting mesh together from different sub structures.

339
00:53:02.580 --> 00:53:13.020
Razieh Emami Meibody: And these different sub structures may have completely different metric history xiaomi expect to have more diverse optimists least at distribution or these already.

340
00:53:13.140 --> 00:53:13.560
Okay.

341
00:53:14.940 --> 00:53:25.860
Anthony Brown: yeah I don't know I haven't looked at the details of the Methodist at distribution for these various clumps i'm not i'm not sure whether they treated in the in the paper.

342
00:53:26.310 --> 00:53:29.910
Razieh Emami Meibody: And I mentioned our own have half actually stole honestly.

343
00:53:29.970 --> 00:53:45.330
Anthony Brown: yeah So then, then they probably all formed from the same cloud which, which has been personally a uniform ethnicity, and so, then, so this is this is unlike, for example, the Omega second cluster where you have multiple populations which could be something.

344
00:53:47.010 --> 00:53:51.930
Anthony Brown: That is more due to evolution of a small system rather than its formation.

345
00:53:53.400 --> 00:53:54.450
Thank you yep.

346
00:53:56.760 --> 00:54:06.360
Ana Bonaca: Thanks Anthony as you're coming close to our kind of time, I just wanted to ask there's been I think some interest.

347

00:54:07.230 --> 00:54:19.260
Ana Bonaca: you're at the CFA have a better candidate possible extensions of Gaia and Twitter like mission like similar missions, I guess we're gonna break up already for the brightest stars at there's also.

348
00:54:19.710 --> 00:54:32.550
Ana Bonaca: Many stars in the galactic plane that are like Oscar bait so I wanted to kind of leave this kind of party and Christian of possibilities of an infrared gaya or like I have for you can think or stars.

349
00:54:33.150 --> 00:54:33.600
yeah.

350
00:54:35.100 --> 00:54:41.730
Anthony Brown: So for the infrared guys really under concrete study so so we've.

351
00:54:44.490 --> 00:54:53.820
Anthony Brown: we've put in a proposal, a while ago with ISA to look into the possibilities of making infrared detectors that are capable of drift scanning which is not.

352
00:54:54.360 --> 00:55:03.150
Anthony Brown: Currently, these are not available, and that would allow you to do exactly the same mission concept as Guy ever done an extended to the to the infrared and.

353
00:55:03.900 --> 00:55:13.620
Anthony Brown: Then predictions are that you will have something of the order of 8 billion sources, even if you go out to just the depth of guy or a little bit further just because you're.

354
00:55:14.730 --> 00:55:17.610
Anthony Brown: penetrate the all the way into the galactic plane.

355
00:55:18.900 --> 00:55:28.290
Anthony Brown: Now, so he saw took it a bit further, and they did a complete mission design study with the aid of some of some of the people in deepak.

356
00:55:29.700 --> 00:55:38.340
Anthony Brown: The conclusion on the infrared detectors it's it's very expensive to develop them with drift scanning capability and in Europe, there is no real.

357
00:55:39.720 --> 00:55:48.090
Anthony Brown: infrared detector industry at the level required that's something that you would have to do that maybe would tell a diner.

358
00:55:49.440 --> 00:55:55.230
Anthony Brown: And, and there are options There are options under study to also in the literature for for making.

359
00:55:56.310 --> 00:56:09.750
Anthony Brown: TDI capable infrared detectors but that would be difficult and the other option was to have other means of stabilizing the image in a rotating spacecraft, for example, a mirror that rotates along with the.

360
00:56:11.730 --> 00:56:24.630
Anthony Brown: With the with the motion of the stars to keep the image stable that makes us very nervous, because the any any moving parts on something that where you want to keep things stable at the nanometre level is is worrisome.

361
00:56:25.680 --> 00:56:33.660
Anthony Brown: But with the calculations that they did so far, it seems to fit into the into the attitude accuracy budget.

362
00:56:35.160 --> 00:56:50.040
Anthony Brown: But yeah, this is still being looked into at the moment the status is that we put this in for proposal for this mission for the voice should have 50 program of of ISA and just took the process was started early last last year.

363
00:56:51.510 --> 00:57:06.780
Anthony Brown: And right now, because of covert etc it's it's a little bit stalled, so we I don't know what the what the status that we have gotten some questions on specific aspects of the mission, and I think it's been it's been well received, also on the back of the success of guy.

364
00:57:08.580 --> 00:57:24.960
Anthony Brown: But you can there are papers on on archive the proposal itself is in fact on archive, I think, so you can have a look at that for more details and it will also appear in experimental astronomy soon as it as a full fledged to paper but that's the most concrete.

365
00:57:26.070 --> 00:57:28.830
Anthony Brown: option at the moment and we have done some thinking about.

366
00:57:30.000 --> 00:57:40.650
Anthony Brown: Even crazier stuff going to nano second precision, where you know you can really start directly measuring parallax is out into the local group, etc, but def wouldn't.

367
00:57:41.760 --> 00:57:49.380
Anthony Brown: You know at this moment, the only thing we can come up with this isn't a different interface symmetric mission, because you need a very long baseline to get the.

368
00:57:50.460 --> 00:58:07.080
Anthony Brown: Extra magic accuracies but then, how do you do a global a symmetric concept with that because it's you can no longer easily realize this scanning revolving mission that guy oh within within within interferometry where you have formation flying etc, so that.

369
00:58:08.370 --> 00:58:10.050
Anthony Brown: That still requires a lot more.

370
00:58:11.430 --> 00:58:21.450
Anthony Brown: Thinking creative thinking people would completely different ideas, etc, and one of the issues data is also if you really start pushing it to that level of accuracy.

371
00:58:23.220 --> 00:58:38.130
Anthony Brown: Things like light Vending in the solar system become even more important for Gaia to correct for it, and that means you need to know like masses of all the asteroids things like that develop our relativistic theories too much better precision.

372
00:58:39.240 --> 00:58:47.490
Anthony Brown: there's also the question of whether you will have enough compact sources in the universe, to serve as a reference Rachel things that are very much smaller than than an AU.

373
00:58:49.410 --> 00:58:57.810
Anthony Brown: So yeah there's there's quite some some some thinking to be done there, but of course would be great if we could get there at some point.

374
00:58:59.280 --> 00:59:00.960
Ana Bonaca: definitely something to aspire to.

375

00:59:01.680 --> 00:59:15.360
Ana Bonaca: Yes, thank you, thank you Anthony for the great talk, thank you for all your work on the guy on mission for making the beta public hope to have you back on the new developments happened.

376
00:59:16.380 --> 00:59:16.980
Ana Bonaca: Thank you.

377
00:59:17.220 --> 00:59:21.720
Anthony Brown: Yes, let's let's see if we can, if I can make it over there in.

378
00:59:22.560 --> 00:59:23.370
Anthony Brown: person points.

379
00:59:24.270 --> 00:59:25.530
Anthony Brown: really nice, yes, yes.

380
00:59:26.280 --> 00:59:27.660
Anthony Brown: Okay, thanks, was a lot of fun.

381
00:59:27.960 --> 00:59:28.560
Morgan Elowe MacLeod: Thank you.

382
00:59:28.860 --> 00:59:31.500
Ana Bonaca: Thank you, thank you all for coming see you next week.

383
00:59:33.960 --> 00:59:36.090
Ana Bonaca: gets worse and worse here.

384
00:59:37.230 --> 00:59:37.920
Ana Bonaca: we're gonna have a full.