
AbSciCon
2017
MESA, ARIZONA

1
00:00:12,250 --> 00:00:06,150
you

2
00:00:16,810 --> 00:00:14,220
[Music]

3
00:00:19,480 --> 00:00:16,820
thank you for being here I'm speaking on

4
00:00:21,400 --> 00:00:19,490
behalf of my collaborators Maggie

5
00:00:23,170 --> 00:00:21,410
Turnbull Eric Mamo check Ella Osby a

6
00:00:25,929 --> 00:00:23,180
ginger Skolnick and the rest of the ASU

7
00:00:27,999 --> 00:00:25,939
Nexus team what we've done is we've put

8
00:00:30,040 --> 00:00:28,009
together multiple different sorts of

9
00:00:33,090 --> 00:00:30,050
stellar properties and we smash them

10
00:00:35,320 --> 00:00:33,100
together in order to form ketchup

11
00:00:39,430 --> 00:00:35,330
catalogue Estella unified properties

12
00:00:41,680 --> 00:00:39,440
yeah I made that pun all right so this

13
00:00:43,390 --> 00:00:41,690

is based off of EXO cat which is the

14
00:00:45,880 --> 00:00:43,400
catalogue that Maggie Turnbull put

15
00:00:48,090 --> 00:00:45,890
together about a year or two ago and

16
00:00:51,280 --> 00:00:48,100
this is created in order to support

17
00:00:52,990 --> 00:00:51,290
imaging mission such as W first what

18
00:00:55,119 --> 00:00:53,000
she's done is she's combined looked

19
00:00:58,270 --> 00:00:55,129
through all the literature and she's put

20
00:01:00,639 --> 00:00:58,280
together a stellar information for stars

21
00:01:04,990 --> 00:01:00,649
within 30 parsec so right now EXO cat

22
00:01:06,820 --> 00:01:05,000
has 2351 stars in it now one of the

23
00:01:08,370 --> 00:01:06,830
hardest things that maggie has done is

24
00:01:11,139 --> 00:01:08,380
she's actually tried to understand

25
00:01:13,029 --> 00:01:11,149
exactly how some of these stars are

26
00:01:15,940 --> 00:01:13,039
identified you'd think it'd be a simple

27
00:01:17,920 --> 00:01:15,950
one-to-one correlation but it's not so

28
00:01:19,630 --> 00:01:17,930
there are some stars for example that

29
00:01:21,460 --> 00:01:19,640
have a Hipparchus name but really they

30
00:01:23,200 --> 00:01:21,470
are two stars in there and one of them

31
00:01:25,719 --> 00:01:23,210
doesn't have a name or there are other

32
00:01:27,399 --> 00:01:25,729
cases where one star has two names or

33
00:01:29,620 --> 00:01:27,409
suddenly we see that there's unresolved

34
00:01:31,810 --> 00:01:29,630
stars at all sharing the same thing so

35
00:01:34,300 --> 00:01:31,820
this is actually fairly complicated when

36
00:01:37,060 --> 00:01:34,310
you're trying to very pointedly look at

37
00:01:38,980 --> 00:01:37,070
one specific object so Maggie has done

38
00:01:41,710 --> 00:01:38,990

the very time-consuming they're very

39
00:01:45,100 --> 00:01:41,720
painful task of going through and trying

40
00:01:48,249 --> 00:01:45,110
to identify when I say Hipparcos number

41
00:01:49,810 --> 00:01:48,259
what am I actually referring to so she's

42
00:01:51,670 --> 00:01:49,820
put together all of this information for

43
00:01:52,359 --> 00:01:51,680
the different components within the

44
00:01:54,039 --> 00:01:52,369
catalog

45
00:01:56,560 --> 00:01:54,049
she's also include the basic

46
00:01:59,080 --> 00:01:56,570
observational data and derive stellar

47
00:02:01,090 --> 00:01:59,090
parameters and as I said she's gone

48
00:02:02,800 --> 00:02:01,100
through and done the binary and multiple

49
00:02:07,259 --> 00:02:02,810
system breakdowns

50
00:02:09,910 --> 00:02:07,269
so all of ketchup is based on EXO cat

51
00:02:12,069 --> 00:02:09,920
but additionally we've added into that

52
00:02:15,190 --> 00:02:12,079
the Hypatia catalog so this is my own

53
00:02:17,170 --> 00:02:15,200
baby it isn't it is a stellar abundance

54
00:02:19,120 --> 00:02:17,180
catalog that's an amalgam it from 200

55
00:02:21,130 --> 00:02:19,130
different literature sources so what

56
00:02:23,020 --> 00:02:21,140
I've done is I've combined stellar

57
00:02:26,360 --> 00:02:23,030
abundance data for stars that are all

58
00:02:31,039 --> 00:02:26,370
within 150 parsecs of the Sun ftk type

59
00:02:33,080 --> 00:02:31,049
of 11 m/s and and combined all the stars

60
00:02:35,030 --> 00:02:33,090
that have both iron and a different

61
00:02:36,559 --> 00:02:35,040
element so what you're seeing on the

62
00:02:38,869 --> 00:02:36,569
x-axis are all the elements in the

63
00:02:40,550 --> 00:02:38,879

different species that are thin Hypatia

64
00:02:42,350 --> 00:02:40,560
but also the number of stars for which

65
00:02:44,780 --> 00:02:42,360
these elements have been measured so you

66
00:02:46,490 --> 00:02:44,790
see on right here is iron and that is

67
00:02:48,199 --> 00:02:46,500
going to be the most so it's five

68
00:02:49,759 --> 00:02:48,209
thousand nine hundred and eighty but we

69
00:02:51,710 --> 00:02:49,769
also have quite a number of elements

70
00:02:54,850 --> 00:02:51,720
that are sort of like the lower

71
00:02:56,600 --> 00:02:54,860
refractories and just as a little plug

72
00:02:58,640 --> 00:02:56,610
especially because I'm talking about a

73
00:03:01,280 --> 00:02:58,650
database the head patient catalog will

74
00:03:03,949 --> 00:03:01,290
soon be an online autonomous database

75
00:03:05,599 --> 00:03:03,959
such that anybody can go and look at

76
00:03:07,460 --> 00:03:05,609
this data and you can look at the

77
00:03:09,080 --> 00:03:07,470
multi-dimensional aspect of the data

78
00:03:11,479 --> 00:03:09,090
because I have stellar properties of

79
00:03:13,069 --> 00:03:11,489
abundances for stars as done by

80
00:03:15,800 --> 00:03:13,079
different groups so you don't just need

81
00:03:18,289 --> 00:03:15,810
to email me anymore you can go online

82
00:03:19,910 --> 00:03:18,299
yourself and look at the data and plot

83
00:03:21,649 --> 00:03:19,920
it in real time so that's going to be

84
00:03:23,839 --> 00:03:21,659
high patient catalog calm it should be

85
00:03:25,729 --> 00:03:23,849
available in the fall and there's going

86
00:03:28,670 --> 00:03:25,739
to be a special session at the double-a

87
00:03:32,270 --> 00:03:28,680
s winter and a booth so if you like swag

88
00:03:34,789 --> 00:03:32,280

I'll have swag alright so what we did

89
00:03:36,470 --> 00:03:34,799
was we combined then EXO cat and Hypatia

90
00:03:39,259 --> 00:03:36,480
and the overlap on that with about 800

91
00:03:42,559 --> 00:03:39,269
stars so x''k added about 2300 Hypatia

92
00:03:45,559 --> 00:03:42,569
as has 800 stellar abundances in

93
00:03:47,059 --> 00:03:45,569
addition to that Ella Osby and of Janish

94
00:03:49,190 --> 00:03:47,069
Skolnick once there ended a cross

95
00:03:52,309 --> 00:03:49,200
matching of all of these stars with

96
00:03:55,909 --> 00:03:52,319
Galax so as i mentioned by Adam earlier

97
00:03:59,990 --> 00:03:55,919
galaxy's is looking at UV photometry I

98
00:04:02,089 --> 00:04:00,000
have listed here the wavelengths of the

99
00:04:05,659 --> 00:04:02,099
different bands so what you're seeing in

100
00:04:08,509 --> 00:04:05,669
a blue are the far UV so what they're

101
00:04:11,300 --> 00:04:08,519
you can see like at a temperature

102
00:04:13,369 --> 00:04:11,310
greater than 5500 Kelvin which is where

103
00:04:15,800 --> 00:04:13,379
the photosphere is dominating so you're

104
00:04:17,779 --> 00:04:15,810
getting a rather tight correlation with

105
00:04:20,180 --> 00:04:17,789
temperature but then as temperature

106
00:04:22,279 --> 00:04:20,190
decreases below 5500 you're seeing a

107
00:04:24,439 --> 00:04:22,289
scatter because now the chromosphere

108
00:04:26,360 --> 00:04:24,449
sort of taken over being the dominant

109
00:04:28,550 --> 00:04:26,370
source and now we're seeing some stellar

110
00:04:30,920 --> 00:04:28,560
activity activity which is fairly

111
00:04:33,560 --> 00:04:30,930
interesting overlaid on top is in the

112
00:04:35,420 --> 00:04:33,570
red is the NIR UV and you see that we

113
00:04:36,890 --> 00:04:35,430

have far less stars that have near view

114
00:04:38,220 --> 00:04:36,900
measurements and that's because about

115
00:04:40,860 --> 00:04:38,230
5,200

116
00:04:43,980 --> 00:04:40,870
the we get is sort of the nonlinear

117
00:04:46,200 --> 00:04:43,990
response regime of Galax so what we're

118
00:04:48,810 --> 00:04:46,210
looking at with respect to this data is

119
00:04:51,330 --> 00:04:48,820
the incident UV flux that might happen

120
00:04:53,400 --> 00:04:51,340
that might occur on a planet's surface

121
00:04:56,490 --> 00:04:53,410
and how that would affect ultimately

122
00:04:58,620 --> 00:04:56,500
habitability so in that case we can look

123
00:05:01,470 --> 00:04:58,630
at the ratio of the flux densities and

124
00:05:03,030 --> 00:05:01,480
the far UV and near UV band passes so

125
00:05:05,640 --> 00:05:03,040
this is what we're looking at here on

126
00:05:07,380 --> 00:05:05,650
the X around the y axis with respect to

127
00:05:09,480 --> 00:05:07,390
them to the text effective temperature

128
00:05:11,430 --> 00:05:09,490
now Ella has gone through and she's

129
00:05:13,140 --> 00:05:11,440
removed all of the binaries from this

130
00:05:14,520 --> 00:05:13,150
sample to make sure that what we're

131
00:05:16,350 --> 00:05:14,530
seeing is really what we think we're

132
00:05:19,050 --> 00:05:16,360
seeing so for the stars that I have

133
00:05:21,330 --> 00:05:19,060
circled what we have are incidences of

134
00:05:23,310 --> 00:05:21,340
very high stellar activity which is very

135
00:05:27,330 --> 00:05:23,320
interesting and important to know with

136
00:05:30,090 --> 00:05:27,340
respect to this huge catalog now we have

137
00:05:31,560 --> 00:05:30,100
eric banachek who went through and did

138
00:05:33,960 --> 00:05:31,570

actually he did two things I didn't put

139
00:05:35,760 --> 00:05:33,970
up a slide but he went through and redid

140
00:05:38,010 --> 00:05:35,770
all of our spectral types he is the Guru

141
00:05:39,990 --> 00:05:38,020
as far as I'm concerned of all spectral

142
00:05:41,790 --> 00:05:40,000
type things so he redid all the spectral

143
00:05:44,880 --> 00:05:41,800
types for a source but he also did

144
00:05:46,950 --> 00:05:44,890
x-rays and so he went through and

145
00:05:49,530 --> 00:05:46,960
determined the x-ray fluxes luminosities

146
00:05:52,500 --> 00:05:49,540
and the fractional luminosities for

147
00:05:54,570 --> 00:05:52,510
stars within ketchup but he did so in a

148
00:05:56,310 --> 00:05:54,580
way that has never been done before he

149
00:05:57,930 --> 00:05:56,320
used three different missions so he

150
00:06:02,430 --> 00:05:57,940
looked at chandra which has a peak

151
00:06:05,400 --> 00:06:02,440
energy range of 0.5 to 7k UV and i had a

152
00:06:08,430 --> 00:06:05,410
total of 37 ketchup stars and he did x

153
00:06:11,280 --> 00:06:08,440
mm which is 0.15 to 15 ke v and had a

154
00:06:13,410 --> 00:06:11,290
total of 137 ketchup stars and I'm

155
00:06:16,860 --> 00:06:13,420
finally rosette which had a peak energy

156
00:06:20,340 --> 00:06:16,870
range of 0.12 to 4k TV and had had a lot

157
00:06:21,480 --> 00:06:20,350
so 907 ketchup stars so now these all

158
00:06:23,400 --> 00:06:21,490
these different missions have sort of

159
00:06:27,180 --> 00:06:23,410
different baselines and so he went

160
00:06:28,950 --> 00:06:27,190
through and and reconverted them to the

161
00:06:31,770 --> 00:06:28,960
same baseline in this case it was the

162
00:06:33,390 --> 00:06:31,780
rosette soft x-ray flux system such that

163
00:06:34,830 --> 00:06:33,400

apples could be compared to apples and

164
00:06:36,720 --> 00:06:34,840
we could look at these across the fan so

165
00:06:39,090 --> 00:06:36,730
this was brand new nobody's ever gone

166
00:06:41,340 --> 00:06:39,100
through and redoes all of these x-ray

167
00:06:44,460 --> 00:06:41,350
luminosities and from there we're able

168
00:06:47,490 --> 00:06:44,470
to infer the ages of these stars so

169
00:06:49,390 --> 00:06:47,500
altogether when you have ketchup you

170
00:06:51,490 --> 00:06:49,400
will have a lot of data so

171
00:06:52,800 --> 00:06:51,500
these I tried lifting it all of it just

172
00:06:55,120 --> 00:06:52,810
so you can understand the really like

173
00:06:57,909 --> 00:06:55,130
breath of what we're working with here

174
00:06:59,680 --> 00:06:57,919
so not only do have X ra Dec and XYZ

175
00:07:01,480 --> 00:06:59,690
coordinates but we have those component

176
00:07:03,700 --> 00:07:01,490
analyses that determined by Maggie and

177
00:07:04,990 --> 00:07:03,710
the different Hut part goes number Xin

178
00:07:07,120 --> 00:07:05,000
the system if that's the case where

179
00:07:09,279 --> 00:07:07,130
we're looking at overlaps we have a

180
00:07:13,050 --> 00:07:09,289
kinematic thin vs. thick disk

181
00:07:15,460 --> 00:07:13,060
determination BVB - the determinations

182
00:07:16,689 --> 00:07:15,470
and then we have this spectral type as

183
00:07:19,240 --> 00:07:16,699
we're done by Erik because he's awesome

184
00:07:22,300 --> 00:07:19,250
and this effective temperature that I've

185
00:07:24,189 --> 00:07:22,310
pulled from the pastel dataset I've

186
00:07:27,340 --> 00:07:24,199
included iron carbon oxygen magnesium

187
00:07:29,830 --> 00:07:27,350
silicon calcium and aluminum and as was

188
00:07:31,870 --> 00:07:29,840

mentioned by Patrick because I look I

189
00:07:33,460 --> 00:07:31,880
have an amalgam at data set of stellar

190
00:07:36,400 --> 00:07:33,470
abundances what that means is I have

191
00:07:39,219 --> 00:07:36,410
multiple groups who have measured the

192
00:07:41,080 --> 00:07:39,229
same element in the same star so when I

193
00:07:44,170 --> 00:07:41,090
go through and try to determine what and

194
00:07:46,060 --> 00:07:44,180
overall abundances I take not just the

195
00:07:48,189 --> 00:07:46,070
error that people gave me but I look at

196
00:07:50,950 --> 00:07:48,199
this difference or like what I call the

197
00:07:53,010 --> 00:07:50,960
spread between these groups because that

198
00:07:56,370 --> 00:07:53,020
in my mind is the most important

199
00:07:58,900 --> 00:07:56,380
understanding of how well do we know the

200
00:08:00,700 --> 00:07:58,910
abundance in a star and more often than

201
00:08:02,560 --> 00:08:00,710
not the spread between different groups

202
00:08:04,089 --> 00:08:02,570
is greater than their respective error

203
00:08:07,870 --> 00:08:04,099
that they tend to give so this is an

204
00:08:10,060 --> 00:08:07,880
overall a good indicator of how well do

205
00:08:12,010 --> 00:08:10,070
we understand these abundances so that

206
00:08:14,050 --> 00:08:12,020
will be included so the spread for the

207
00:08:16,060 --> 00:08:14,060
abundances then we have the new UV

208
00:08:18,490 --> 00:08:16,070
magnitude fluxes in there errors and the

209
00:08:20,250 --> 00:08:18,500
far UV for the ultraviolet and then

210
00:08:22,360 --> 00:08:20,260
we'll have all of this great information

211
00:08:24,760 --> 00:08:22,370
I'm not even going to read all of it off

212
00:08:26,500 --> 00:08:24,770
from the x-ray difference all the

213
00:08:28,689 --> 00:08:26,510

different x-ray sources so this will be

214
00:08:31,330 --> 00:08:28,699
coming soon we are almost finished with

215
00:08:32,860 --> 00:08:31,340
it in fact the goal especially since all

216
00:08:35,079 --> 00:08:32,870
my collaborators are in the room is to

217
00:08:37,690 --> 00:08:35,089
submit at the end of May we're doing

218
00:08:39,610 --> 00:08:37,700
this and that it will be available

219
00:08:42,219 --> 00:08:39,620
online because of course the whole point

220
00:08:45,130 --> 00:08:42,229
of doing this especially as as part of

221
00:08:47,380 --> 00:08:45,140
the ASU Nexus team is to put all the

222
00:08:49,300 --> 00:08:47,390
stages together such that people can use

223
00:08:51,490 --> 00:08:49,310
it and find out as much about these

224
00:08:54,440 --> 00:08:51,500
nearby stars as possible and use it in

225
00:09:03,329 --> 00:08:54,450
their own research thank you very much

226
00:09:10,019 --> 00:09:08,199
why not 35 parsecs Maggie why not 35

227
00:09:13,030 --> 00:09:10,029
parsecs

228
00:09:18,810 --> 00:09:13,040
why not 25 but just weird that number

229
00:09:26,019 --> 00:09:24,759
Maggie could you come up to the mic you

230
00:09:28,600 --> 00:09:26,029
know this is based on the Hipparcos

231
00:09:31,329 --> 00:09:28,610
catalog which is our most complete

232
00:09:33,910 --> 00:09:31,339
source of parallax information and you

233
00:09:36,069 --> 00:09:33,920
know beyond 30 parsecs ish hey you're

234
00:09:38,110 --> 00:09:36,079
not really complete with g-type stars

235
00:09:40,150 --> 00:09:38,120
anymore and be the I mean you're just

236
00:09:41,980 --> 00:09:40,160
including more and more junk in the

237
00:09:43,600 --> 00:09:41,990
sample basically I mean not that those

238
00:09:47,550 --> 00:09:43,610

aren't great stars but we just don't

239
00:09:47,560 --> 00:09:55,530
yeah

240
00:09:59,040 --> 00:09:57,629
would ya this is also true for the

241
00:10:01,680 --> 00:09:59,050
stellar abundances after about 30

242
00:10:04,920 --> 00:10:01,690
parsecs we the the sample just drops off

243
00:10:08,060 --> 00:10:04,930
pretty hard all right no more questions