

# Photometric identification of emission line sources in the southern photometric local Universe survey (S-PLUS)

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## ABSTRACT

The emission line objects are very important objects in astronomy because reflects different class of objects that evolved physical mechanics that given counts of formation stellar process, presences the gas, shocks, star-burst in galaxies, the finals stage of stars among others process. For this reason we have created a list of H $\alpha$  emitters selected from the S-PLUS data, which is mapping the southern hemisphere at relatively high latitudes. We implemented the (r - J0660) versus (r - i) color-color diagram for that task. We found 9,200 objects that exhibit um excess in emission in the J0660 which we have traduced as the presence of the H $\alpha$  emission line. In addition we have found that by combining the colors: (r - i) and (g - z) with unsupervised (clustering) machine learning it is possible separate our list of emitters in two sub-groups: one with intense blue continuum and another with intense red one.

**Key words:** keyword1 – keyword2 – keyword3

## 1 INTRODUCTION

The existence of an ionizing radiation field can lead to Balmer hydrogen emission lines. From the presence of the H Balmer lines in the optical spectra of some sources it is well known the possible presence of ionized gas. Many important astronomical objects involve the physics of photo-ionized gases and the interpretation of the emission-line spectra. Emission line objects as the H II regions allow us to study the star formation history of the far reaches of our Galaxy and of distant galaxies. Planetary nebulae let us to see the remaining envelope of dying stars. Star-burst galaxies and QSOs are one the most luminous objects and hence the most distant that can be observed. Their spectra can reveal details about of the first generation of star and the formation of heavy elements in the young universe. On the other hand, emission lines can also infer the presence or lack the accretion discs (??), the properties of single or double picked line can allow us to infer geometrical characteristics (?), the nature of donor stars in binary system (???) and the compact objects as black holes (?).

Emission lines are also associated with stars in very early-type and/or very late evolutionary stage which are short phase. As already mentioned are also associated with binaries that experiencing mass transfer. These group of emission line stars includes young stellar (YSOs) and Herbig-Haro (HH) objects, post-asymptotic and some asymptotic giant branch (AGB), some red giant stars (RGB), Wolf-Rayet (WR) stars, supernova remnants, classical Be stars, active late-type dwarfs, interacting binary system like symbiotic stars (SySt) and cataclysmic variables (CV). Most of these class of object are in-homogeneous and some contains many few identified members,

for instance at the moment around 323 symbiotic system have been identified from which 257 belong to the Galaxy and ~66 are extragalactic objects (?). The same occurs with PNe from witch around 3500 of them are been cataloged (?), this current number of PNe represents only about 15-30% of the estimated total of Galactic PNe (Frew, 2008; Jacoby et al., 2010) showing that a small fraction of the PNe have been cataloged. Many galaxies, in addition to harbor Planetary nebulae and H II regions, show characteristic nebular in their spectra. In most of these objects, the gas is photoionized by hot stars in the nucleus, which is thus much like giant H II region, or perhaps many H II regions. The galactic nucleus with very strongest emission lines of this type are often called blue compact galaxies, extragalactic H II regions, star forming or starburst galaxies (?). There are also spiral galaxies that present emission lines.

In the past H surveys with modest spatial resolutions have been used to identified extended nebular emission to study supernova remnants, galaxy groups and star forming regions (Davies, Elliott Meaburn 1976). More recently, higher resolution surveys such as the INT Photometric H $\alpha$  survey (IPHAS; ??) have focused in the study of compact emission line sources on the Galactic plane, typically with objects in different stage of stellar evolution. The Anglo-Australian Observatory UKS chmidt Telescope Supercosmos H $\alpha$  Survey (Parker et al. 2005) is anothe H $\alpha$  survey of the Southern Galactic Plane and Magellanic Cloud which has covered to b ~ 10–13° (verificar esto). Currently ongoing is the VST Photometric H $\alpha$  Survey of the Southern Galactic Plane and Bulge (VPHAS+; ?) that will cover the Galactic bulge and plane in five filters.

Like VPHAS+, others ongoing surveys that are used to study the population of emission line objects are the The Javalambre Ph-

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tometric Local Universe Survey (J-PLUS<sup>1</sup>, ?) and the Southern Photometric Local Universe Survey (S-PLUS<sup>2</sup>, ?) are providing observations of the Galactic halo covering both northern and southern celestial hemispheres in a systematic way with twin telescopes using the same set of multi-band filters. In addition to the H $\alpha$  filter, which is already vastly applied to systematically searching for H $\alpha$  emitters the telescopes offer 11 more filters. And more ambitious yet the JPAS survey that will the same area of J-PLUS in 56 narrow-band filters.

Traditionally, color-color diagrams based in H $\alpha$  filter are been used to identify H $\alpha$  emitters. The analysis the color-color diagram (r - H $\alpha$ ) versus (r - i) has resulted on the discovered of new emission line objects, for instance ?? used the (r - H $\alpha$ ) versus (r - i) colour-colour diagram to find for new CV. On the other hand, ? reported the discovery of YSOs by using this same colour criteria. In this sense using this methology a variety of classes of objects are been identified, which include symbiotic stars (??), early type emission line stars (?) and planetary nebulae (??). Recently, by using this same color diagram were also identified compact PN candidates in VPHAS+ catalog (?). And the same diagram in conjunction with new ones shows to be very efficient to find for PN candidates (?). In general terms, ? presented a methodology and first results in looking for emission line sources in narrow-band surveys.

In this work, we used S-PLUS observations of the southern hemisphere to search for objects with an excess of H $\alpha$  using automatic methods based on the (r - H $\alpha$ ) versus (r - i) color-color diagram we also used color criteria based in (g - r) and (z - g) in conjunction to unsupervised machine learning techniques to split the final list in those with blue and red continuum. The paper is organized as follows...

## 2 OBSERVATIONS

Particularly, we are implemented data from S-PLUS DR3 (ref) to carried out our study. S-PLUS is 12-band optical photometric survey, which are formed by using seven narrow-band and five broad-band like SDSS filters. The narrow-band set include the filter J0660 which detect the H $\alpha$  emission line. Figure 1 shows the Javalambre filter system (Marfn-Franch et al. 2012) overlapping are the optical spectra of several class emission line objects on which it is possible to see that the H $\alpha$  line falls into the J0660 filter, except for the QSOs.

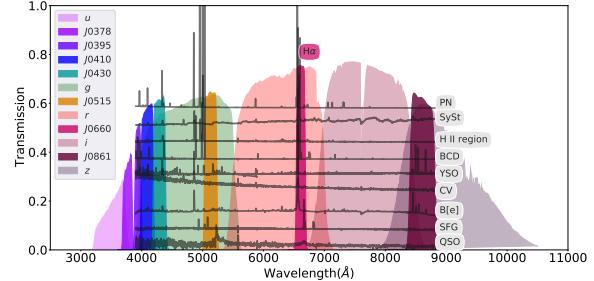
The actual data release contains about 60 millions of objects covering a total area of  $\sim 8000 \text{ deg}^2$ , at high Galactic latitudes ( $> 30 \text{ deg}$ ) using a dedicated 0.83m robotic telescope, the T80-South (T80S), located at Cerro Tololo, Chile. S-PLUS will cover an additional 1300 deg $^2$  of the Galactic plane and bulge to enable Galactic studies. In this work, we focus on the aspects that are of particular interest to the second data release of the S-PLUS main survey. Additional information about S-PLUS can be found in ?.

## 3 METHODOLOGY

We first constructed a sub-sample from all S-PLUS DR3 from which we applied an iterative and automatic technique to select objects with an excess of H $\alpha$  emission line, as we describe below:

<sup>1</sup> <https://www.j-plus.es>

<sup>2</sup> <http://www.splus.iag.usp.br>



**Figure 1.** Transmission curves of the S-PLUS filters set. The narrow-band filter J0660 detects the H $\alpha$  emission line. Over-plotted are different classes of emission line objects, from upper to down PN, SySt ...

### 3.1 Initial selection sample

The first step in our selection procedure consist in the following criteria to guarantee the quality of the observations of the objects:

- (i) The sources must have detection in the filters:  $r$ ,  $i$  and J0660. To assure that we select object must have error minor or equal to 0.2 in each of three filter.
- (ii) Must have an  $r$  magnitude until  $r = 21$ .

### 3.2 Finding the main stellar locus and selecting the H $\alpha$ emitters

Once the initial cut were made, we proceed to select the objects with an excess of H $\alpha$  which is represent relatively high value of the filter J0660 in comparison with r-band filter. For that we first divided our sub-sample in for magnitude bins using the  $r$ -band magnitudes. The bins have the follow distribution:

- 1 bin- objects with magnitude in the  $r$ -band  $r < 16$
- 2 bin- objects with magnitude in the  $r$ -band  $16 \leq r < 18$
- 3 bin- objects with magnitude in the  $r$ -band  $18 \leq r < 20$
- 4 bin- objects with magnitude in the  $r$ -band  $20 \leq r < 21$

To select t sn ? presented a catalogue of point-sources H $\alpha$  emission objects identified in IPHAS.

To select the emission lines we used the same method created and implemented by ? its possible to do that because the S-PLUS has similar filters that the IPHAS project, which are  $r$ , J0660 and  $i$ . This technique was used by ? to identify blue objects with excess of H $\alpha$  and after that ? also applied this methodology to create catalogue of candidate H $\alpha$  emission showing a high effectiveness. Applying the selection criteria to selecting H $\alpha$  emitters. We used the same procedure in ?. The objects with H $\alpha$  excess meet the condition:

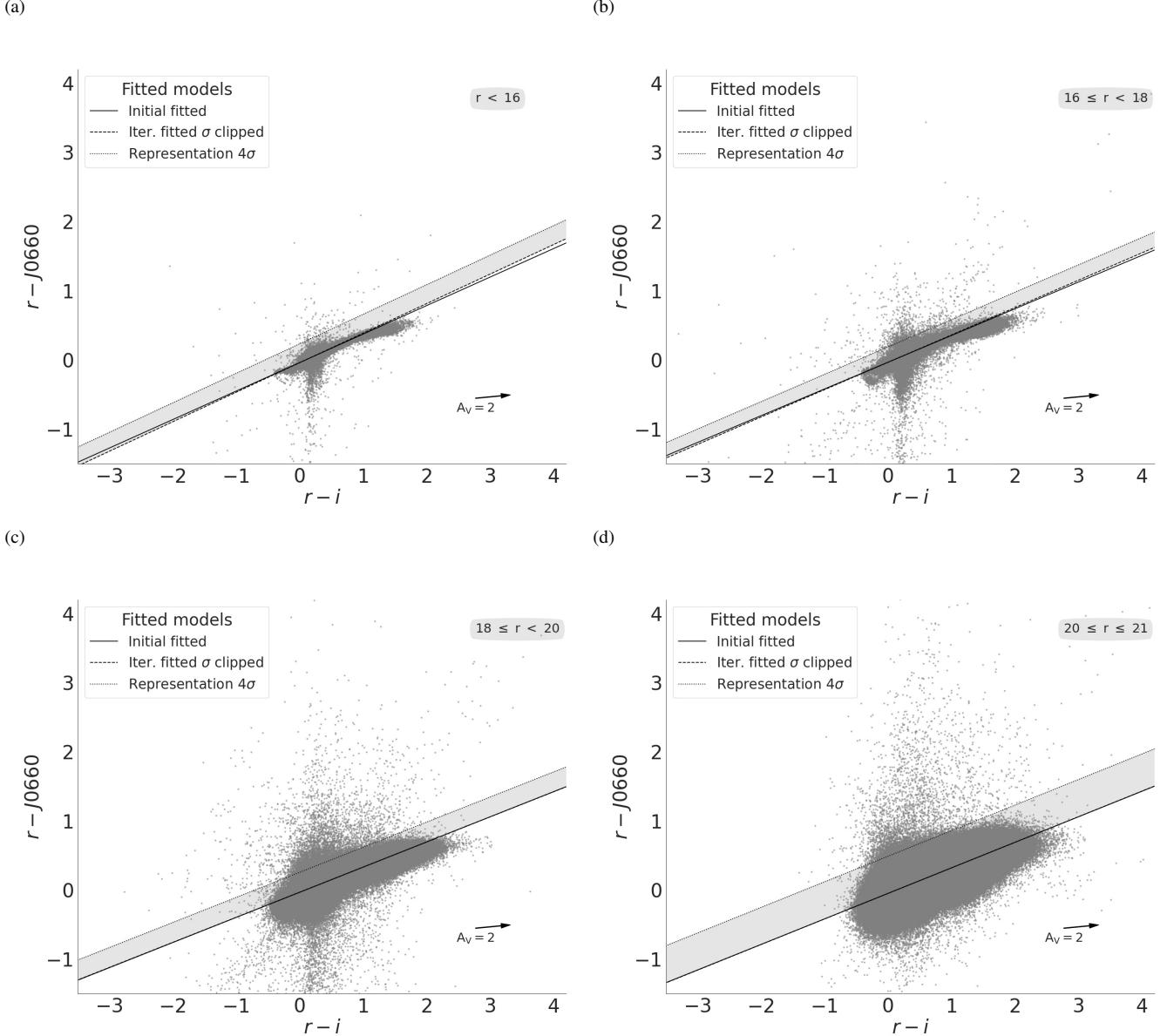
$$(r - J0660)_{\text{obs}} - (r - J0660)_{\text{fit}} \geq C \times \sqrt{\sigma_s^2 - \sigma_{\text{phot}}^2} \quad (1)$$

where  $\sigma_s$  is the root mean squared value of the residuals around the fit and  $\sigma_{\text{phot}}$  is the error on the observed  $(r - J0660)$  colour

Firts see an aproximation of the  $4\sigma$  cut away from the ariginal fit.

In Figure 2 is illustrate the selection process. The black line represent the fit

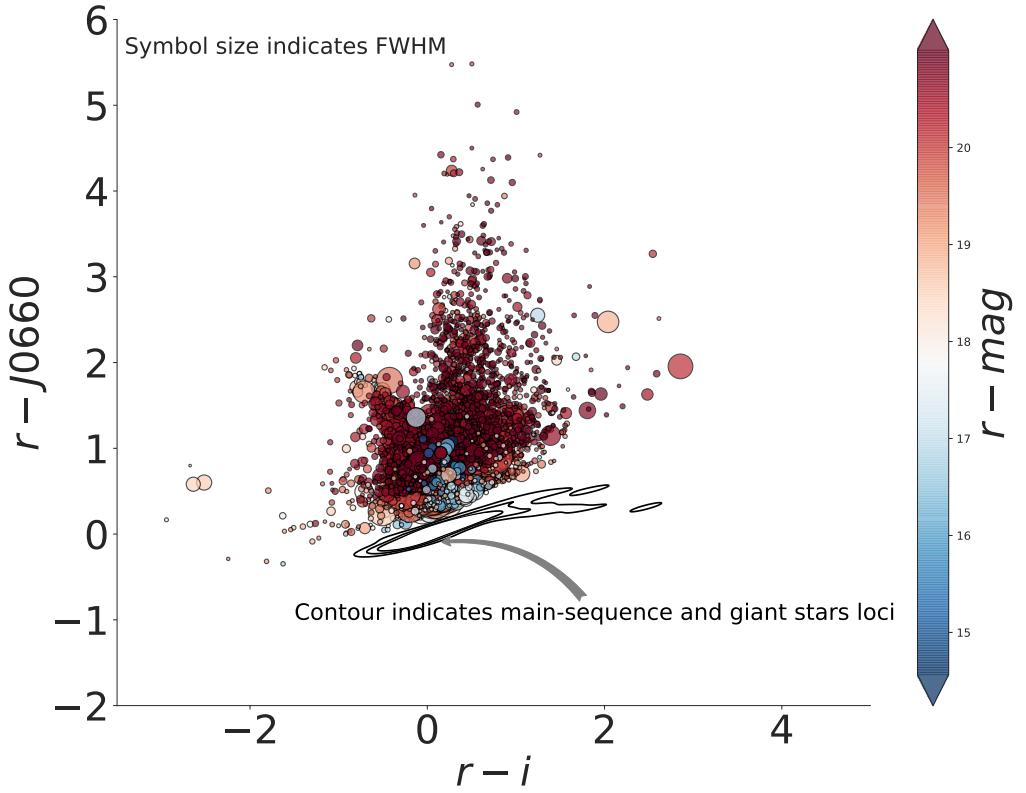
### 3.3 Maths



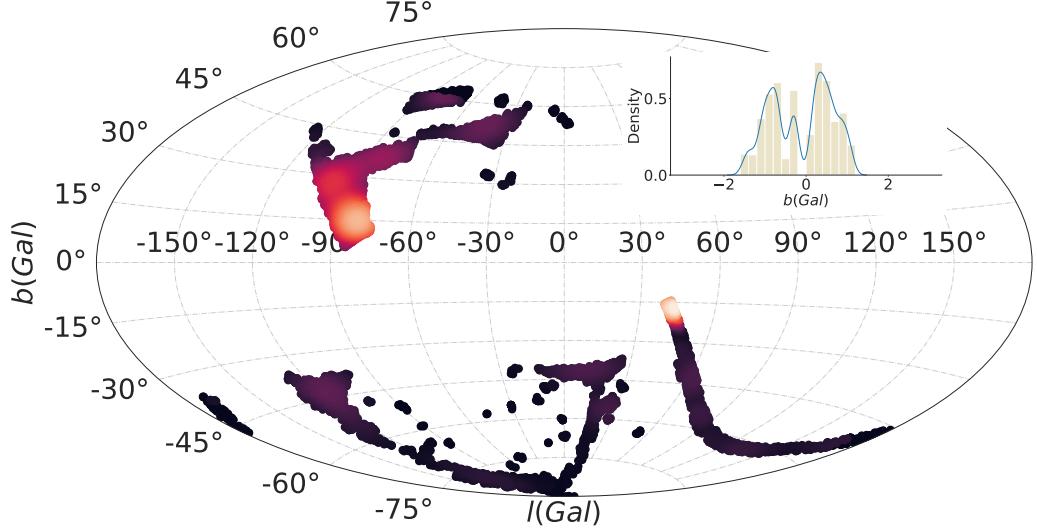
**Figure 2.** An illustration of the selection criteria used to identify strong emission-line objects via colour-colour plots. The data shown here are all from the S-PLUS DR3. The data are split up into four magnitude bins, as shown in the four panels. Objects with H $\alpha$  excess should be located near the top of the colour-colour plots. The thin red lines illustrate the original least-squares fit to all the data (grey points). The thin blue lines represent the final fits to the upper locus of points obtained by applying an iterative -clipping technique to the initial fit. The actual cuts used to select H $\alpha$  emitters are shown by the thick dashed lines. If the cut was based on the initial (final) fit, it is shown in red (blue). Objects selected as H emitters must be located above the cut and are shown as large triangles. Note that the cut lines shown here are only approximate, as the actual selection criterion also considers the errors on each individual data point. This explains, for example, why an object in the bottom right-hand panel is not selected despite clearly lying above the cut line.

### 3.4 Figures and tables

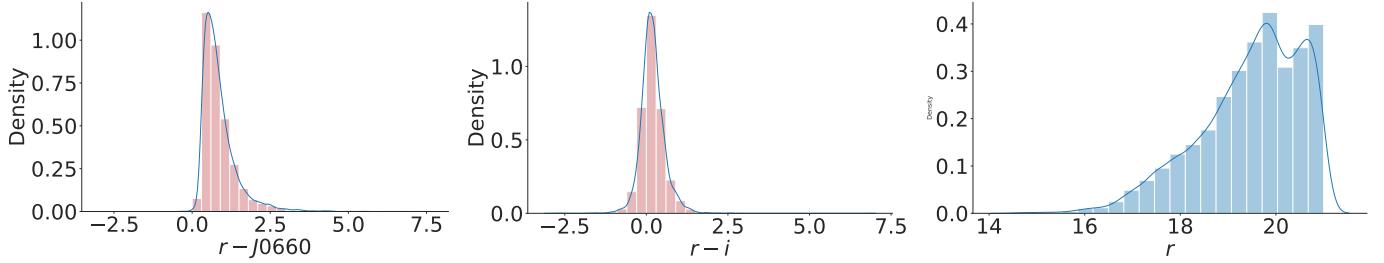
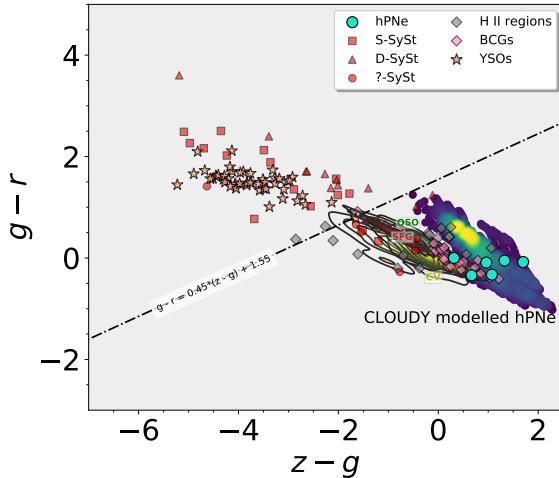
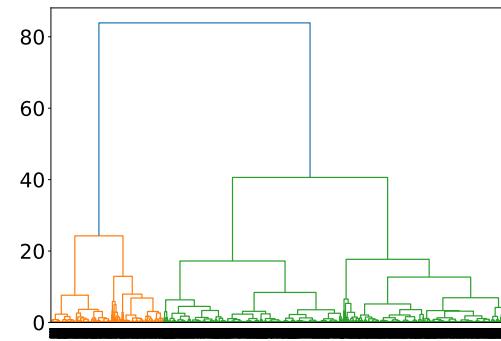
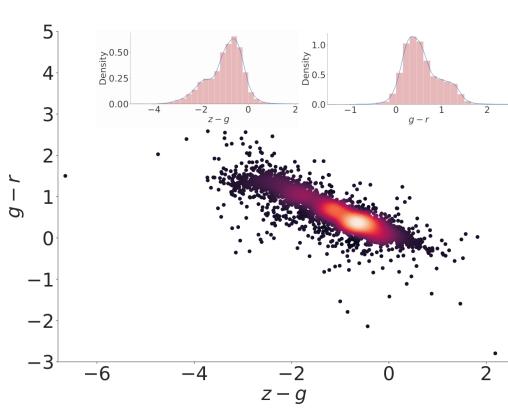
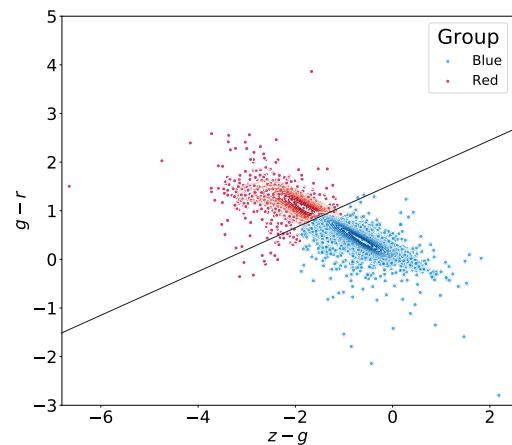
## 4 RESULTS

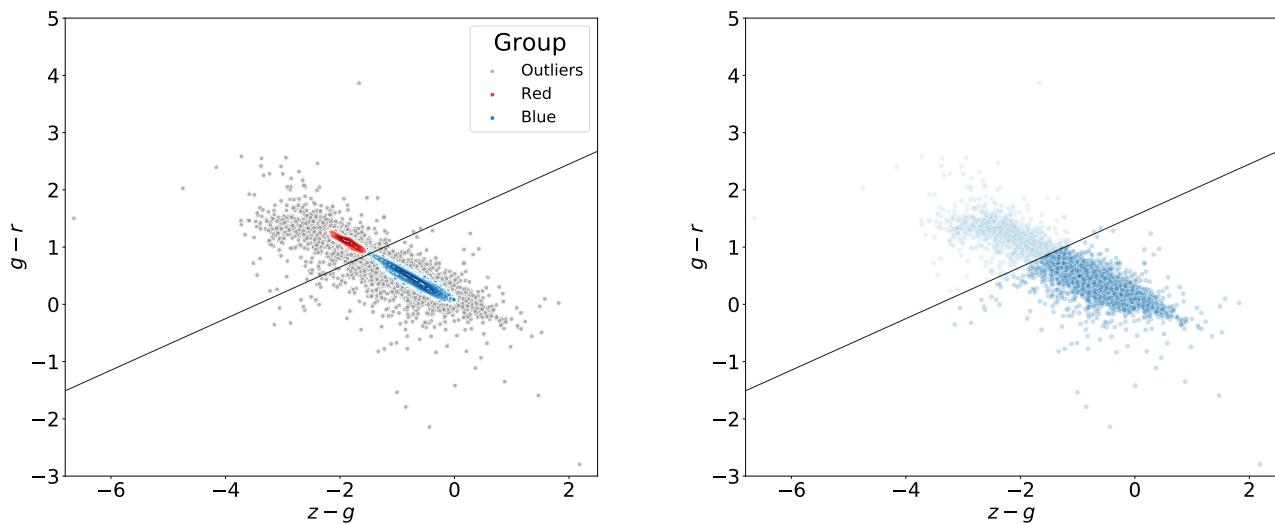


**Figure 3.** Colour-colour diagram with all the emission line objects selected from S-PLUS DR3. Size of the symbols represent the measured FWHM assuming a Gaussian core (for more detail see ?). Colored bar is the magnitude values in the r-band. The contours represent the synthetic main-sequence and giant stars loci from the library of stellar spectral energy distributions of ?.



**Figure 4.** The distribution of H emitters in Galactic longitude and latitude. The emitters are shown as red points if brighter than  $r = 18$ , and black points if fainter. The S-PLUS direct fields are shown by green squares (offset fields are not shown). All emitters are shown here, including those with flagged with 'c' in Table 1.

**Figure 5.** Emission lines selected...**Figure 6.** Classifying...**Figure 8.** Costomer dendrogram...**Figure 7.** Classifying...**Figure 9.** Costomer dendrogram...



**Figure 10.** New color-color diagram to separate the blue objects from the red ones.

#### 4.1 Simbad

RA	DEC	UpS <sub>total</sub>	F378 <sub>p</sub> S <sub>total</sub>	F395 <sub>p</sub> S <sub>total</sub>	F410 <sub>p</sub> S <sub>total</sub>	F430 <sub>p</sub> S <sub>total</sub>	G <sub>p</sub> S <sub>total</sub>	F515 <sub>p</sub> S <sub>total</sub>
0.4968921619628843	-29.3112214428821	20.911818	20.405222	19.925909	19.733429	19.669731	19.723387	19.5140
0.6279554824066291	0.8331230804411939	18.843164	18.716341	18.695929	18.705236	18.484932	18.50342	18.3942
0.6982473212090481	-0.373204977953541	99.0	99.0	22.160957	99.0	24.709087	23.18503	99.0
1.286523747867553	-30.851162659705377	22.750626	21.804417	22.177399	99.0	22.300152	21.0689	20.5522
1.658281373282977	-0.6156060790712984	99.0	23.082613	99.0	26.370613	21.005907	22.437506	99.0
1.791687271704504	0.8914261244525057	18.051054	17.802666	17.893925	17.884342	17.805138	17.741405	17.607
2.038930048182944	0.8264638152844974	23.274878	21.606401	20.812637	20.980452	21.164185	21.009556	20.5085
2.328179105177891	-0.6519420575037337	21.13094	21.801186	20.425594	21.073402	21.599384	20.950487	21.0313
2.666987531261032	-29.740921877458867	18.829227	18.684553	18.761686	18.764002	18.693333	18.794508	18.9640
2.7030486187917577	-29.791327943410987	22.177454	21.65072	20.761133	21.428944	21.189764	20.172743	19.7257
2.7306881758399904	-30.739852073510534	19.54575	19.461926	19.559193	19.414352	19.279243	19.083326	18.8906
3.1199364195988752	-31.04443153319788	20.447678	20.119179	20.751774	20.17981	20.184221	20.242548	20.0775
3.3638162881857334	0.875614770300196	18.274765	17.836054	17.969278	17.96479	17.881065	17.837841	17.716
3.6199743565125737	-0.7455029176005269	20.414774	19.57137	19.817759	20.131863	20.211803	19.47428	18.221
3.7333117402685474	0.3176892728434901	19.503107	19.344265	19.455742	19.395203	19.330532	19.477024	19.3588
3.860510825587982	0.3037236200425542	19.692705	19.566334	19.589317	19.453459	19.453487	19.50542	19.5402
3.898110576074378	0.8989176411595012	19.79734	19.701622	19.868141	20.004776	19.945961	19.804089	19.9284
4.117681731557023	1.1338942388667368	20.78595	20.01138	19.839115	20.125704	19.81927	19.853544	19.756
4.174451424491121	-31.44905004903269	17.339844	16.980835	17.123953	17.202797	17.102728	17.251049	17.2132
4.380258459418438	-0.8164386494043362	19.253767	19.25041	19.36043	19.461105	19.419315	19.38897	19.4030
4.416543859611166	0.5062627804218517	19.226833	18.601547	18.628735	18.579643	18.568651	18.41704	17.9189
4.474256625814649	0.8493703288672522	20.88688	21.199509	21.513279	20.967575	21.330238	21.257814	21.7203
4.801640792188885	0.0554916881824542	20.162327	20.051575	20.050007	20.371433	19.920683	20.300861	20.1500
4.917646791908225	-0.9099503373848068	19.56396	19.362297	19.441816	19.45684	19.527401	19.516129	19.549
4.958578954314056	-0.6779700699260857	23.140005	21.635616	22.411383	99.0	23.127716	22.198391	21.552
5.657902318221463	0.0886788337120439	20.34319	20.239143	20.700527	20.897964	20.21973	20.627573	20.524
6.280815147745145	0.3125654118801338	19.53141	18.97362	19.069742	19.289497	19.066242	18.972666	18.3990
6.333011956389121	0.525479973176037	18.360916	17.849205	17.731264	17.761017	17.785358	17.61795	17.2062
6.974318052697582	-0.9667199252402	19.178333	18.73612	18.610416	18.44271	18.373678	18.242424	17.9367
7.320040644293336	-1.0064266381068807	19.650259	19.061935	19.340328	19.31336	19.304873	19.114666	18.5756
7.416749471161749	1.0913027872498264	18.485476	18.29707	18.362953	18.483002	18.345703	18.331276	18.340
7.464354807727703	0.7000037288417243	20.16184	20.19286	20.418028	20.740105	20.498842	20.131512	19.9334
7.823701945596341	0.2847385223835051	23.522974	99.0	21.753149	99.0	99.0	22.906433	99.0
7.906256073243137	-29.47091029710251	20.748947	20.639124	21.620857	20.46924	20.728615	20.748825	20.5644
7.961265608895669	-28.92685732854085	19.615688	18.940151	18.966148	18.983988	18.93493	18.867826	18.4981
7.969005194202078	-29.592587811984853	20.832012	20.755035	20.555508	20.494265	20.428131	20.27602	20.221
8.035561688713287	-0.8843461346218345	20.612062	20.608892	21.646057	21.602676	20.770315	20.537659	20.6117
8.144241522878199	-0.2658504803749659	23.457968	21.970648	25.039955	20.85026	22.493488	20.475376	19.909
8.144555784075553	-42.66955742286215	25.009365	99.0	20.360622	19.987957	19.947323	19.290337	19.4948
8.178072183921541	0.5197450140043085	19.724096	19.113724	19.817242	19.802452	19.725754	19.622414	19.5873
8.477954545229275	-29.936853996206867	20.313307	19.877064	19.600945	19.698925	19.3711	19.422108	19.2274
8.821276175970617	-42.088597877208215	99.0	22.128658	22.924137	21.794607	22.843456	20.994476	21.1314
8.941080203860544	0.3849934246315855	22.444138	21.053728	20.96262	20.50462	20.2375	19.838345	18.8676
9.10579672267925	-0.4853030603908992	21.333723	20.76739	20.329302	21.218565	20.966417	20.249687	20.231
9.160164736675396	-32.5790767643802	20.923332	20.394783	21.33955	20.781857	20.454285	20.453037	20.0066
9.308785545285224	-0.9344374247364892	99.0	21.907227	21.67617	24.048664	99.0	22.819256	23.4454
9.342361420176386	-0.1946009608261733	19.508595	19.326881	19.395151	19.202435	19.275612	19.223362	19.2693
9.4213937498701	0.5555554739851708	20.263268	19.657515	19.653862	19.4713	19.541908	19.263882	18.5229
9.747289111980264	-0.714454350224955	22.206736	21.27095	21.092716	99.0	21.221878	20.682896	20.2987
9.876175084523542	1.3391251468348433	21.098768	21.301245	21.78191	21.190733	20.6663	20.809372	20.4314
9.89493608957293	0.8602458369384121	18.336473	17.972088	17.737104	17.610222	17.459423	17.306679	17.103
9.89493608957293	0.8602458369384121	18.336473	17.972088	17.737104	17.610222	17.459423	17.306679	17.103
10.565064891250165	-32.21589781391012	20.382261	20.361912	20.376337	20.239208	20.46936	20.155872	19.9614
10.682789961127495	1.283933341653539	19.846878	19.764736	19.70643	19.722256	19.822224	19.865437	19.7955
10.84118200857788	-33.31747498120273	19.873207	19.569447	19.351387	19.480885	19.362667	19.115189	18.2753
10.896509451927638	-0.6248809118328724	20.166248	19.95014	20.40572	19.973392	20.239311	20.021137	19.7362
11.065875879315966	-0.717518646194803	99.0	99.0	22.072018	21.193584	20.89479	20.493637	19.477
11.434797546075147	-31.95811304109312	19.847744	19.768	19.711573	19.983624	19.801388	19.920183	19.924
11.609577132522691	-1.237997024045413	21.010595	20.929829	20.923306	20.879398	20.924217	20.414078	20.362

12.112387692202818	-34.22741726899439	20.97262	20.5298	20.330791	20.37513	19.819735	19.397434	19.1302
12.32716144605164	1.2191920530524625	19.600533	19.557987	19.400986	19.497532	19.393337	19.491196	19.593
12.955915679701484	0.5649407893753414	18.945885	18.139717	18.347137	18.424374	18.360886	18.121096	17.5094
12.98183382570476	-26.962028288894874	19.998617	20.00083	19.84936	19.527765	18.228842	19.203533	19.435
12.99884215031428	-0.489110520414667	18.450457	18.044699	18.31725	18.408577	18.333275	18.180178	17.632
13.215039941128667	-27.32576442209961	20.757555	20.186996	20.077944	19.768703	19.629324	19.638577	19.546
13.43231563480846	1.363190953245345	20.092983	20.02324	20.44506	20.459959	20.251469	20.219234	19.9838
13.564745864622545	-1.0822213962934328	20.633436	19.858051	20.300636	19.837172	19.780577	19.740011	19.3495
13.667158618404784	-32.011715009609304	21.131176	21.0779	20.22911	21.019705	20.968246	20.711292	20.3456
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13.97214405926334	-33.65042770377668	20.490812	20.257278	19.981787	20.249523	20.078947	19.499594	19.288
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33.10437995801359	-33.083042512325804	21.619715	21.211012	20.35588	20.3729	20.368826	21.47705	20.4840
33.60091505746918	-33.24777452929094	19.955282	19.292507	19.377178	19.29496	19.390741	19.266882	18.9460
33.69844878804215	-32.709786589316614	19.631645	19.100899	19.114523	18.952005	18.78721	18.661533	18.4306
33.87092614743144	-0.8874609989930496	19.822334	19.667065	19.960638	19.94936	19.91338	19.846851	19.7599
34.006750737249284	-31.61438842877632	19.512524	19.078966	18.844973	18.93445	18.656607	18.600426	18.4314
34.05728735762157	-30.84910309956719	19.221865	18.82857	18.579414	18.433472	18.393425	18.197704	18.0711
34.07162177605453	-1.17963313592842	23.674313	22.793367	21.862103	21.24813	21.211018	20.215464	19.674
34.543835265892945	-1.0297901208560476	19.818308	19.814676	20.117836	19.999626	19.959078	20.023495	20.0453
34.866661573073486	-30.76277662129932	17.425066	17.176054	17.145454	17.611431	17.667282	17.508165	17.6999
35.3022376237971	-30.43306611004649	20.52211	20.936623	20.619362	20.056099	20.30801	20.167746	20.1244
35.82052533020276	-1.0137779997035794	21.32888	21.173376	21.411377	21.267439	21.219563	21.022587	20.9984
36.07140219729569	0.10724100290268	99.0	19.900661	19.123499	19.402824	19.197428	23.04192	18.7595
36.21975140764737	-34.10951561423316	20.970144	20.143248	20.024261	20.894472	20.275017	19.96774	19.564
36.37884288953809	-0.8353138394540365	21.245264	20.72352	20.207083	20.550333	20.249393	19.82999	19.6198
36.61785108970139	1.1604400554801353	17.57489	17.19075	17.175665	17.151428	17.094032	17.085358	16.9844
36.61785108970139	1.1604400554801353	17.57489	17.19075	17.175665	17.151428	17.094032	17.085358	16.9844
36.69277213609015	-43.59156135457005	21.00539	21.164137	20.285725	20.90794	19.971544	20.386457	19.3862
36.81029852296449	1.0934074799976583	20.56969	20.472775	20.178669	20.174618	20.158783	20.310188	20.1208
36.83039522616293	1.025612852538597	21.032372	20.361362	20.275888	20.039673	20.330452	19.961163	19.5199
36.90951623742346	-31.607345845404307	19.017975	18.937683	19.16633	19.189753	19.084156	19.18018	19.061
36.99250641431996	0.0404421118141437	99.0	99.0	19.62529	99.0	99.0	20.513733	19.9950
37.06050668375983	-39.267782818411305	20.180473	19.525	19.343994	19.184622	19.26019	19.20431	18.7444
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37.43891173256027	0.1489862508458985	22.259995	21.98571	21.966564	21.298561	21.418205	21.18887	21.0386
37.47787637713116	-30.599559376424764	17.378244	17.003435	17.171207	17.307674	17.236546	17.31438	17.232
37.48751137869475	-1.0089856734353149	22.620186	17.249937	17.028028	16.691004	16.617031	18.605999	15.4946
37.54069701310436	-31.60505123369656	19.757504	19.216496	19.256212	19.071026	19.041065	18.837471	18.1248
37.58720416243717	0.2321681675793745	20.46603	20.485447	20.242468	20.56919	20.449364	20.607203	20.6443
38.03891271958179	-1.3861949894293877	20.081068	19.373293	19.334839	18.919287	18.649944	18.191502	17.9168
38.07534927116573	-33.84528829588545	19.903603	19.405825	19.384987	19.58232	19.694168	19.36132	18.4764
38.12763748929023	-1.2817952492366265	19.887543	19.564613	19.705126	19.594664	19.540512	19.541956	19.5600
38.174504835656805	-39.295229245873685	19.075674	18.480152	18.775402	18.933811	18.691826	18.496101	17.9473
38.20293944460951	0.8607798584028256	21.2442	21.2722	21.801748	21.994164	21.855698	21.126402	21.3443
38.34423535712647	0.8498264300321089	20.584566	20.236967	20.526316	20.540257	20.429348	20.407518	20.505
38.39285833594685	-39.04470809996566	15.672163	15.49906	15.407729	15.359983	15.265117	15.1967125	15.084
38.39735766972906	-1.1290537121536242	18.493362	18.024801	18.391577	18.346973	18.414875	18.400055	18.385
39.11980508074	-0.9749932035748634	19.725935	19.179047	19.174332	19.306889	19.317036	19.075853	18.508
39.14871940890983	-0.5342706372644691	20.881628	20.772343	21.041973	21.27711	20.927809	21.194792	20.866
40.24643683967374	0.7627476177593495	99.0	21.658546	20.864414	22.543306	21.190691	20.91885	19.449

40.6454475160122	-1.0644227483678184	20.048973	20.028198	20.172342	20.111921	20.305315	19.935236	19.840
40.69556506354039	0.0239358351857076	22.527597	22.700104	99.0	99.0	21.359566	21.02578	21.863
40.89837979736232	1.3771938278420643	18.467817	17.966805	18.331612	18.494303	18.399666	18.462727	18.42
40.90704549503712	1.3729265625996037	20.360119	19.230385	20.024178	19.475206	19.588432	19.39289	19.21
40.92809118446975	1.3595621460159046	19.727987	19.04982	19.278072	19.375744	19.109638	19.243046	19.33
40.933458965510255	1.3779211213547329	19.93842	19.505096	19.809185	19.671095	19.680897	19.544788	19.408
41.52198188668681	-33.08317001603085	18.19818	17.735214	17.767471	17.696495	17.609913	17.475897	17.331
41.60058125535593	-0.4980253582007756	18.0057	17.633942	17.649485	17.567863	17.499914	17.525497	17.394
41.60311859466317	-0.5045181639339942	17.915548	17.475653	17.719196	17.673107	17.612844	17.601723	17.526
41.60593375574607	-0.5027112363938046	17.997313	17.67941	17.76512	17.677948	17.635477	17.661352	17.534
41.61070793418088	-0.5000978872359795	18.511574	18.0778	18.074331	17.949848	17.881712	17.865784	17.741
42.75267977777988	0.2853735115843281	21.594406	20.970379	21.342688	20.302193	19.781685	20.239197	20.450
43.06969129708544	0.2947725157476631	20.20404	20.004879	19.569944	20.003506	19.738644	19.443186	19.35
43.21668023139433	-0.3698979850578264	20.029993	20.068592	19.934612	20.109621	20.088715	20.04347	19.908
43.60887244004112	-0.6896473847720612	18.772911	18.080093	18.217413	18.355228	18.392567	18.07011	17.231
43.98850261320957	0.692640180601257	20.000408	19.257084	19.022297	18.813122	18.531633	17.908552	17.653
44.030210339218165	1.1774555299992029	19.60405	19.440136	19.471943	19.595787	19.338148	19.361952	19.188
44.10549886585857	0.5748223254603584	20.555212	19.988922	20.33091	19.898514	19.68476	19.648277	19.386
44.118458575759135	0.6078355659352473	20.859594	20.13063	20.225601	20.26931	20.489573	20.239586	19.628
44.439740352809245	-33.482079149106816	20.662735	20.562363	20.570667	20.148735	20.850729	19.938318	19.536
44.79324003091252	-0.3777292200872463	18.883099	18.375328	18.544062	18.663836	18.522224	18.581547	18.584
45.79093859633274	0.2271602138922271	21.642355	22.26067	99.0	21.078968	21.97218	21.597843	21.768
46.05196517556931	-1.192719988695097	19.420395	18.940613	18.782564	18.532667	18.42015	18.149363	17.906
46.07402391239703	-0.8254163698523541	21.412712	21.543118	20.964876	23.437016	20.839481	20.949821	20.87
46.144829680398814	-0.4751996068898478	19.319275	18.816553	18.871233	18.676174	18.664192	18.526917	18.295
46.20769411378219	-0.1370507568661265	19.137466	18.91376	18.776266	18.63844	18.400978	17.845026	16.91
46.2415646756668	0.9538832761700016	20.273382	19.597029	19.615261	19.448513	19.30952	19.058945	18.552
46.32601371119922	-0.1594812724372881	19.294033	18.920826	18.896149	18.624908	18.48463	18.296415	18.09
46.55298185202796	1.3659244829765935	18.127241	18.044107	18.100704	18.198132	18.035198	17.996567	17.90
46.621732236032	-33.89231237580181	21.461851	22.048512	21.703896	21.045956	23.10977	21.50008	21.72
46.62637094367816	-0.1063532167324183	21.76482	20.859478	20.558395	20.216263	20.310226	19.210684	18.802
46.81501686424852	0.7312750476021798	20.52692	20.115362	19.951042	19.842525	19.553707	19.589447	19.29
46.98979992986573	0.120017369478221	19.62077	19.637007	19.554535	19.620464	19.614735	19.54169	19.613
47.87373270347458	-0.2837361426333072	19.549545	19.493406	19.63409	19.72517	19.589554	19.648842	19.719
47.87885012806618	-31.880860044582445	17.563465	17.475428	17.280186	17.524384	17.40985	17.67805	17.668
48.202558396796846	-31.48630904526674	19.563267	19.174068	19.15311	18.927996	18.831722	18.74287	18.495
48.24315359852245	-0.0815656430783389	21.164484	20.578556	21.068932	20.681025	20.23439	20.038458	19.610
48.48367671208701	-31.470164460703632	20.234198	19.644783	19.524849	19.774372	19.857681	19.357563	18.270
48.61771428658176	0.7519402356960914	19.99437	20.018593	19.90036	19.729095	20.005482	19.666561	19.437
49.06378553118447	-31.209241913161897	20.480354	19.710583	20.332726	20.227797	20.24752	20.112953	19.886
49.0750504981236	-0.5069279648561904	20.807848	21.093767	20.893381	21.324375	20.85316	20.54284	20.09
49.21104988541157	-33.30106752208543	18.803097	18.11707	18.330696	18.348312	18.247898	18.126244	17.897
49.21108348383686	-33.30109956831036	18.780262	18.143215	18.35465	18.273136	18.154894	18.091303	17.833
49.62107027321726	-0.0112548928671764	20.990343	20.794529	20.751802	20.97203	22.444891	20.827297	20.873
49.68820265523018	-0.3125867996889615	22.304508	22.075356	20.871721	20.54823	20.096313	19.64252	18.68
49.905357996326025	-0.4447129467729893	20.459494	20.451946	21.120188	20.92123	20.560848	20.566967	20.420
50.68707745560916	0.7450965554947673	20.673685	20.53903	20.484943	20.479975	20.48815	20.316414	20.049
51.26729795433997	-36.92773995131392	19.625828	19.133522	18.889435	18.921053	18.91747	18.825546	18.562
51.3044429528618	-36.369356180322086	19.469917	19.019852	19.017017	19.014832	19.029848	18.997295	19.11
51.48028596578508	-32.88302604889567	21.430836	21.133543	23.082384	22.4991	22.30098	21.269081	20.499
53.10952432881614	-1.1905549158813071	20.398872	20.27828	21.220533	20.47431	20.975166	20.328468	20.218
53.10958810574174	-1.190642242028551	20.387974	20.160597	20.118334	20.288815	20.443892	20.139109	20.015
53.292001605589874	0.1469919509442148	24.073395	21.836103	21.967234	20.846226	20.850645	20.940273	20.723
53.74365145217437	-0.1288517115468432	20.292442	20.339344	19.927221	20.712967	20.264347	20.263718	20.288
54.58960430404596	0.5184971700047292	20.657133	19.992826	19.979622	20.037903	19.763412	20.28595	19.968
54.67234367033864	-35.52621813852562	20.262028	19.844608	20.541307	20.149433	19.806602	20.028904	20.013
54.67235585673245	-35.52616012986378	20.27262	19.406067	19.831375	19.627953	19.622158	19.949398	19.968
54.86439460038415	-34.61862342769125	20.288363	20.291265	20.50069	20.50679	20.193073	20.288872	20.36
55.05160899500496	-35.62780439037955	20.015793	19.732265	19.64177	19.763016	19.657629	19.555113	19.464
55.08289490156473	1.0585242193939064	20.737755	21.185215	21.192993	21.195393	21.540546	20.687305	20.38
55.09580981936138	-35.26861884407053	19.0877	18.961998	19.031801	19.113674	19.005617	18.985607	19.031
55.21032155384233	-35.439371817285185	20.077755	19.99748	20.17015	20.353035	20.074905	20.056911	20.057

55.38562960618687	-34.88861116743838	18.572271	18.080915	17.918398	17.708485	17.671679	17.568642	17.479
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55.76939354280558	0.4200849545421101	22.199694	20.357843	20.913176	20.52985	20.56867	21.030972	20.135
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56.32088432677072	-0.2638128432166242	19.99295	20.188623	20.514626	20.193333	20.281904	19.91438	19.953
56.43910392669589	-36.34612610981142	19.374025	18.831955	18.98626	18.796577	18.70615	18.648123	18.766
56.51053562993339	-0.0162825970895807	21.093365	20.507454	20.369114	20.157307	20.095665	19.776562	19.363
56.84143331660593	-32.85143564003734	21.081059	20.342375	20.02244	20.100542	20.13786	18.780537	18.382
57.28305368748847	1.162003553131273	18.95501	18.475782	18.53876	18.511547	18.437717	18.41195	17.900
57.28697520415392	1.1628501269812663	19.313251	18.692749	18.555254	18.428055	18.253185	18.172384	17.912
57.830647615852506	0.5379309203257563	20.886986	20.821722	20.925274	19.932095	20.194159	19.138653	19.107
58.760643529078	-38.594508054321246	21.71052	21.179445	20.399527	20.584892	21.24543	19.649857	19.148
58.81671653823677	-37.49575812066213	20.593441	20.484867	20.639887	20.671032	20.40181	20.433254	20.184
58.91021078569528	0.4763724886809515	20.383888	20.291386	20.234682	20.316078	20.205688	19.865452	19.739
59.023230308727214	-49.47798028782121	19.226158	18.695936	18.830883	18.72303	18.590126	18.40342	18.29
59.21160650977977	-0.2430266735645456	22.032942	22.24008	21.92655	21.567064	20.803461	21.400608	20.657
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59.384437936839966	-0.0132210920265977	19.655214	19.190996	19.202528	18.958252	18.818062	18.537033	18.244
59.76629933224044	1.359321839400579	18.69162	18.211872	18.072691	17.92755	17.910156	17.66256	17.448
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60.98645768730256	-38.23292063597632	19.155165	18.857605	18.734825	18.928854	18.966883	18.907997	18.363
61.17143615831319	-34.96550088599031	18.640549	18.08422	18.04939	18.096521	18.044365	17.953543	17.495
61.33498273596544	-36.81638793661925	19.12919	18.765656	18.686972	18.742449	18.590118	18.79099	18.695
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61.366561383475336	-38.18946988054663	20.207014	20.401358	20.301704	20.802505	20.283028	20.204376	20.37
62.877144254160285	-33.89197020875841	17.827099	17.777733	17.933323	17.977932	17.908092	17.945873	17.869
62.9931906508685	-37.97889641219351	19.492851	18.906816	18.82365	18.764385	18.736343	18.48635	18.020
63.22209217387362	-31.30837649675762	18.620007	18.013435	18.277168	18.120022	18.055511	17.960491	17.784
63.24997813266718	-38.32846190144912	19.231815	18.776583	18.445715	18.474306	18.359722	18.281952	17.992
65.02824515881092	-32.85555378019325	20.100204	20.16646	21.217716	20.431892	20.625994	21.06591	20.72
65.23682931827716	-32.84522864914376	21.068531	20.020174	20.985462	20.678429	20.624252	20.34076	19.929
66.49750313852422	-43.27294370064416	18.150059	17.73587	17.649242	17.491913	17.323381	17.130894	16.920
66.63573911050027	-41.03239942176444	19.974463	19.400383	19.31707	19.368483	19.122234	19.126091	18.749
66.68476952384738	-42.261434192503216	19.256271	18.74184	18.635235	18.613062	18.39707	18.2942	18.049
66.68695800025141	-42.09458791504701	19.61968	19.08475	19.127476	19.366825	19.304995	19.288815	19.133
66.68714006680887	-42.97731957959581	20.567558	19.698025	19.7122	20.159515	19.545446	19.444775	19.065
66.92599861968759	-42.63898741357326	18.943825	18.405798	18.067894	18.522552	18.368258	18.291603	18.107
67.11963551092221	-43.24142208891916	18.575241	17.995993	17.73484	18.164043	17.88273	17.69022	17.492
67.91485862835738	-30.25392017250568	18.146343	17.846752	18.00373	18.078054	18.170528	17.96227	18.146
68.18465267691735	-32.02224565575888	22.903252	21.860758	21.029642	21.629196	21.507597	20.066658	19.908
68.29080626237631	-43.77044714232464	19.715374	19.11075	19.024557	18.9674	18.820284	18.772778	18.531
68.83252077391391	-42.20328938270354	18.02853	17.498028	17.461609	17.408943	17.283394	17.13879	16.910
68.92411946177829	-47.878850433212456	19.434738	18.99458	18.822678	18.763573	18.72983	18.737911	18.6
69.29655862698584	-46.68521526277068	19.139973	19.28313	19.27471	19.249674	19.204367	19.403774	19.42
69.3258708273691	-32.36953198691898	20.495636	20.433865	19.864475	19.443293	19.74274	19.774014	19.326
69.3959956471664	-44.34132589285379	19.522575	18.931677	18.60103	18.456535	18.23127	18.056696	18.019
69.59805855964451	-33.08572978600444	21.657509	20.784142	21.348057	20.11808	20.519081	20.304562	19.593
69.86435708444397	-42.98661407860815	17.934696	17.442617	17.659067	17.769032	17.73469	17.871176	17.842
71.43743287875098	-38.64685520996582	20.090258	19.676552	19.57077	19.412457	19.413898	19.364532	19.033
72.09605095751637	-44.88268692292141	18.492603	17.828976	17.919956	17.89838	17.78848	17.649292	17.299
72.5097904389203	-47.47749473675231	20.702393	20.523506	20.198528	19.814571	20.044794	20.279587	20.005
72.95356751115321	-46.6268828264031	18.845827	18.34958	18.256277	18.198097	18.025063	17.973873	17.756
73.12966757047025	-44.18451458170195	17.851238	17.718447	17.90881	18.161583	18.000528	18.166553	18.231
73.33107814604597	-32.775789122825564	20.440035	19.842138	20.16666	19.662876	19.729565	19.95844	19.39
73.67932821336544	-48.22227714319606	18.192375	17.853	17.935665	18.048798	18.01791	18.06674	18.080
73.71975877176362	-37.32095899536727	17.876942	17.28759	17.381819	17.543354	17.481056	17.259123	16.368

73.75077658898451	-37.25984603891258	17.373882	16.780941	16.728867	16.761566	16.672903	16.572739	16.100000
73.8604762285104	-30.5912705964922	20.134184	19.495745	19.540972	19.986843	19.689392	19.665829	19.142000
149.25704125132305	-26.49125060546518	20.301285	19.636942	19.70404	19.87186	19.745098	19.545639	19.269000
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149.34776368562885	-7.214281786532718	20.285948	19.48975	19.64412	20.280273	20.362694	19.404312	18.145000
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152.12536783724758	-26.359156873827526	20.764198	20.075583	20.086906	19.971746	20.093039	19.907206	19.311000
152.30756133387325	-43.00250347539357	19.67991	19.352058	19.332932	18.692543	18.799006	18.206816	18.080000
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156.9703863167105	-43.90311040224713	18.104733	17.771175	17.84544	17.751312	17.648842	17.608486	17.471
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157.6274499803631	-36.47975718945754	20.202396	19.526993	19.805271	19.631798	19.627644	19.315151	18.478
157.6274682004481	-36.479748605745336	20.13008	19.590603	19.532507	19.641907	19.569511	19.30737	18.521
157.7403937388915	-34.70791610390661	19.172428	18.605862	18.585802	18.476326	18.384453	18.148691	17.938
157.75073627506603	-40.17847373737768	20.074194	19.597342	19.48637	19.34382	18.977978	18.574099	18.313
157.8745742217274	-32.71308133498473	18.035675	17.651026	17.46616	17.169765	17.058138	16.815277	16.58
157.96713209517503	-34.853619773852564	19.117676	18.511696	18.500206	18.049164	17.770334	16.949423	16.405
157.98905881760817	-41.81141143980291	20.32148	19.891312	20.67571	19.877464	19.89072	19.843658	19.183
158.24673600744714	-27.54358314016397	18.620903	18.14301	17.935225	17.87748	17.778751	17.712713	17.484
158.32248528920698	-43.07862690646628	19.384487	18.951183	18.821737	18.861656	18.54761	18.424835	18.339
158.5031268315751	-35.282679860025794	18.743338	18.369839	18.153353	17.95389	17.80807	17.638454	17.491
158.50313124725002	-35.28257740972755	18.781725	18.437021	18.093723	17.968102	17.879293	17.727942	17.548

158.61142286949843	-27.50109937658653	20.239914	19.55565	19.496826	19.460617	19.351171	19.1237	18.760
158.66144673587488	-28.583352366148148	17.01699	16.431452	16.472237	16.384766	16.264406	16.074696	15.687
158.72747432181612	-20.548791249883188	17.39684	16.903164	16.892143	16.858917	16.774715	16.674364	16.440
158.74382525909093	-40.91202846007671	18.023983	17.472553	17.203375	17.128353	16.980953	16.804398	16.549
158.76197984814078	-29.506601635883555	18.770536	18.256237	17.999735	17.969013	17.836874	17.757526	17.583
158.78217874356557	-27.991310579496265	18.937027	18.458092	18.403048	18.255447	18.148657	18.072464	17.944
158.82799732327132	-36.87848044358572	18.344418	17.909409	17.859585	17.646374	17.503187	17.325205	17.148
158.84031456075968	-27.695706429361035	19.458607	18.936756	18.897192	18.803684	18.724852	18.654795	18.40
158.88207558555908	-30.83334548440517	21.006401	21.053394	19.848467	20.164448	19.954279	20.03651	19.87
158.89231455964594	-44.57808865211405	20.511612	20.175974	20.003273	19.788834	19.64714	19.456707	19.36
159.01109904047328	-24.906702733164057	20.475498	19.876514	19.905313	19.47932	19.680359	19.615753	19.157
159.02890003630893	-28.295841627615104	20.43525	19.973192	19.960808	19.760807	19.624762	19.413198	19.240
159.09213938275613	-25.37651306213532	18.728012	18.394049	18.124647	18.015287	17.902092	17.744507	17.599
159.12642175053503	-27.90110338436836	21.070461	20.654692	20.569918	20.609776	20.42915	20.344078	20.270
159.1895107330749	-28.167422472389195	20.118553	19.703373	19.674593	19.62218	19.65064	19.362877	19.242
159.22859031523527	-26.240560203605337	19.959475	19.632349	19.513628	19.529234	20.110222	19.178017	18.336
159.23368459218906	-26.903779869033656	20.06779	19.453981	19.37756	19.868929	19.351639	19.2085	18.94
159.25764732775707	-28.3671309867131	19.792225	19.219023	19.117023	19.141968	18.954826	18.728031	18.633
159.2685358307238	-31.365924306516472	18.555592	18.034756	17.794565	17.688189	17.589767	17.493813	17.292
159.30363493989583	-27.683956942836808	18.505306	18.176811	18.012604	17.890713	17.788626	17.595234	17.48
159.33289005555525	-28.238872359967427	19.618683	19.093884	18.92884	18.79712	18.679401	18.564919	18.434
159.3425230747454	-27.544963483924352	20.295002	19.772772	20.002468	19.93488	19.953554	19.827206	19.486
159.47885157911082	-24.42906249628565	21.886658	21.298294	20.540802	22.122538	20.880291	20.598589	20.25
159.52433508127856	-25.09446001133432	18.203686	17.721813	17.612782	17.548317	17.48016	17.343206	17.108
159.55988117082038	-38.09040420988944	20.563328	20.097227	20.207165	20.17941	20.371208	20.09675	19.877
159.6195197846552	-28.51528044835931	19.757862	19.184814	19.18341	19.15033	19.020212	18.899912	18.614
159.62643334547482	-23.54853332522397	18.406704	17.893284	17.754906	17.721918	17.516651	17.375427	17.17
159.63924688805704	-27.737156832802217	18.986515	18.562235	18.407377	18.351063	18.204191	18.034908	17.917
159.67291882499617	-25.592286212707226	18.372902	17.99371	17.983475	18.014315	18.063347	17.930576	17.273
159.73852013561282	-20.04493226744504	19.012335	18.416664	18.420902	18.329527	18.41312	18.230648	18.006
159.80424882724313	-20.636809607995904	20.265545	19.751879	19.683643	19.479322	19.306154	19.234009	18.983
159.8583643577597	-23.75467363684896	19.143082	18.60931	18.482273	18.292095	18.158966	18.06605	17.833
159.9998687263755	-47.023971746909325	16.665422	16.465754	16.438694	16.504269	16.440733	16.416805	16.38
159.9998687263755	-47.023971746909325	16.665422	16.465754	16.438694	16.504269	16.440733	16.416805	16.38
160.12922543109804	-29.26958257985193	18.680853	18.106071	17.970623	17.930475	17.786097	17.684443	17.473
160.24459285878757	-21.78454117893259	19.864037	19.42884	19.225674	19.101994	18.865034	18.446087	18.218
160.2588369311913	-30.794483697929085	18.944603	18.171497	18.269947	18.128038	17.951694	17.801964	17.555
160.26609841870317	-34.18983231402896	19.87613	19.273933	18.934689	18.554064	18.534084	18.191795	18.182
160.31322227492322	-21.02303660410036	18.297817	18.078163	18.078844	18.053326	17.93511	17.630093	17.413
160.36546852844964	-31.780316177810057	18.425373	17.875072	17.67951	17.548203	17.40641	17.259743	17.105
160.36546852844964	-31.780316177810057	18.425373	17.875072	17.67951	17.548203	17.40641	17.259743	17.105
160.3964705972055	-37.46929287562097	18.953619	18.51348	18.216894	18.262762	18.11153	17.915693	17.72
160.41429810549982	-27.777270815267524	19.201023	18.844852	18.83391	18.804596	18.77576	18.665895	18.370
160.52757582075228	-22.105582546244552	20.133232	19.597876	19.941444	19.939785	19.680227	19.544796	18.783
160.581242806875	-36.320460681862535	18.942272	18.485653	18.587608	18.657442	18.606758	18.426292	17.975
160.65827140741635	-23.935679330514013	18.772652	18.17546	17.999554	17.82573	17.773994	17.698359	17.536
160.8791677599853	-30.77221131800008	18.496326	17.857027	17.802372	17.746986	17.616592	17.503822	17.228
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161.0404678812419	-20.81930794850729	19.112988	18.52546	18.608011	18.417048	18.23669	18.104298	17.837
161.25085749109647	-22.15227748471596	18.99781	18.482758	18.491512	18.381489	18.229694	18.14756	17.971
161.394795164108	-24.28370035395108	19.14329	18.61922	18.559881	18.597504	18.354883	18.240181	17.97
161.57129581271013	-28.42321162775831	17.797333	17.607903	17.469633	17.311043	17.271854	17.104055	16.97
161.62610118824867	-30.321619430632296	20.501513	20.084743	19.982883	19.992691	19.964878	19.851593	19.518
161.6602141109401	-36.353314928386006	19.45235	18.831245	18.707111	18.60809	18.459915	18.343563	18.099
161.69807525519326	-23.32773309331226	18.06385	17.485447	17.419544	17.40575	17.246294	17.108465	16.741
161.84960610101908	-41.99703765702019	18.007818	17.879318	18.2122	18.683836	18.680935	18.7854	19.01
161.9348517270216	-20.96356099589758	17.988255	17.194685	17.515785	17.562311	17.637423	17.075447	16.13
161.9671272252362	-20.08148354643084	18.489449	17.897667	17.896248	17.899572	17.813305	17.687212	17.214
161.96719252130313	-20.081516627814896	18.380104	17.793255	17.766582	17.733053	17.738392	17.53722	16.968
162.09779631183395	-25.16210701557664	17.133953	16.327122	16.537428	16.37664	16.188246	15.336355	14.552
162.10543718248564	-21.850134134896635	18.210506	17.489996	17.839546	17.839891	17.852951	17.531475	16.868
162.10604102445896	-25.16002800864644	19.967983	19.380688	18.744781	18.70021	18.629316	18.148153	18.259

162.17634873432067	-32.6437113818742	18.06585	17.626074	17.459867	17.393814	17.221437	17.144403	16.988
162.44532875160957	-28.67697878087972	20.467276	19.954384	19.977833	19.874939	20.02382	19.805729	19.469
162.6651817194897	-18.542879179509185	18.46069	17.979424	17.749363	17.584145	17.328259	17.025532	16.823
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162.75753741468907	-28.33790302356877	20.426125	19.90113	20.08992	19.781317	19.697247	19.55724	19.392
162.86415841998232	-19.6936241482243	19.14237	18.613287	18.463821	18.436333	18.294317	18.29596	18.161
162.95445605894844	-21.88819830344904	19.852196	19.055113	19.38547	19.506395	19.419218	19.186176	18.719
163.13766385805908	-23.149877815633783	19.142412	19.006117	19.20405	18.866928	18.993061	18.87093	18.866
163.6701579306735	-39.22193302241251	21.926277	21.036005	20.747253	20.799011	20.457045	20.492191	20.49
163.84009494937516	-23.424249462174128	18.24552	17.725805	17.595324	17.482891	17.361578	17.1868	16.939
163.8401072399262	-23.42423690390457	18.277353	17.786205	17.650213	17.456985	17.36192	17.214708	16.967
164.15997638632015	-20.78672855473099	18.445274	18.08295	17.8266	17.706306	17.57532	17.51654	17.37
164.20211131014338	-19.833433033461127	19.572666	19.006355	18.983871	19.040234	19.096712	18.839087	18.407
164.26801410841605	-33.15564025093645	18.188093	17.66397	17.719244	17.51636	17.469135	16.994616	16.656
164.3079665625576	-47.66979296726016	17.761076	17.380558	17.42616	17.3591	17.34473	16.718203	15.943
164.40217291905444	-35.5043965318927	20.353857	19.8894	19.888885	19.749214	19.688892	19.476192	19.129
164.68435964333	-19.158632283113736	18.374575	17.83391	17.627604	17.58208	17.428377	17.357433	17.105
164.7459588212315	-31.60947413507693	17.620346	17.605198	17.571579	17.658857	17.667019	17.746738	17.639
164.79107984418525	-27.9998147852096	18.764229	18.269077	18.140247	18.014389	17.860142	17.757187	17.569
165.46357641452303	-46.88458955272901	21.039686	20.244043	20.172184	19.811264	19.766617	19.374004	19.23
165.49154204855074	-23.790923666401383	20.039598	20.383015	20.014603	19.980618	19.90444	19.841959	19.549
165.90237819943616	-21.629405520763783	17.90864	17.772688	17.670736	18.04697	17.899624	17.967476	17.917
165.9423233893419	-23.245019645533223	17.787786	17.652885	17.586887	17.476572	17.358156	17.28073	17.068
165.99608941173514	-18.77670167044572	19.666914	19.226048	19.064852	19.04792	19.066044	19.058096	18.99
166.8045693341223	-19.81867010242588	18.91658	18.32203	18.230871	18.277924	18.140102	18.012936	17.903
166.8297173445012	-19.55555857294575	17.174072	16.736538	16.589645	16.432953	16.281607	16.075035	15.907
166.8297504542546	-19.55541255601515	17.28335	16.902195	16.760826	16.545376	16.319082	16.09977	15.862
166.9493403358462	-20.02226907187982	18.234938	17.886295	17.585253	17.59211	17.469715	17.398613	17.316
167.71070433927775	-21.97451931840779	19.013462	18.682873	18.41959	18.381804	18.235771	18.040222	17.857
167.73846916883397	-21.9481524929022	20.260677	19.960325	19.817415	19.621925	19.470509	19.425896	19.198
168.4623790067395	-21.44856383511027	18.421597	17.849436	17.909788	18.012306	17.907112	17.719246	17.292
168.67501934507874	-23.727739165310048	16.733114	16.234577	15.916232	15.776366	15.620495	15.42386	15.242
169.1815896684582	-17.194855188675877	17.631618	17.265484	17.256626	17.324944	17.227816	17.243217	17.151
169.31254592914237	-18.973439165695304	20.742344	20.409798	19.808372	20.327168	19.825985	22.287745	19.381
169.39609173910995	-22.751735680185	20.498875	20.04067	19.810041	19.86979	19.216784	18.44823	18.081
170.73371282684457	-24.4777875977149	18.596292	18.253735	18.284945	18.123331	18.185621	18.016716	18.024
172.39240723207388	-24.777518733865605	21.00764	20.288183	20.290823	20.49152	20.022078	19.887083	19.122
172.868588307185	-19.98410951303733	19.222633	18.769888	19.110397	19.079208	18.90482	18.951443	18.829
173.0792138701351	-21.661910741435744	20.468245	20.40301	20.84034	20.735851	20.412823	20.348736	20.742
173.60216658108814	1.1543503176286625	19.934164	19.450813	19.318203	19.419836	19.039492	18.868025	18.301
174.05290786239414	0.0819136002772735	20.587358	20.675152	19.89515	19.491806	19.62697	19.135344	19.263
174.15304036864492	0.8172611304944561	17.951918	17.576363	17.621191	17.625597	17.639153	17.583937	17.462
174.15329276947446	0.8154915247975553	18.109499	17.661148	17.662107	17.977226	17.829939	17.061945	16.429
174.34240673564196	1.816372111607291	18.633987	18.473595	18.450016	18.667303	18.640816	18.73414	18.64
174.45820819375535	-20.1269725960127	19.066475	18.98397	19.051802	18.968483	19.083027	18.943396	18.888
174.726375893798	-1.6428088681911317	20.177795	19.817657	19.691757	19.706167	19.776348	19.655622	19.262
174.73164786697532	-21.19658104320207	19.092295	18.36328	18.162655	17.89709	17.785551	17.586697	17.518
174.75578476142175	1.3382478314723678	19.700535	19.19914	19.343784	19.491348	19.485258	19.304308	18.779
174.7681233226218	-1.4402891840929772	19.144365	19.17131	19.172659	19.181347	19.28564	19.178122	19.243
175.395908754587	-18.19457670541773	19.67086	19.189798	19.02066	18.900576	18.895144	18.785019	18.400
175.44030773451672	-1.901335843741868	18.744215	18.141071	18.227772	18.21621	18.082722	17.905668	17.274
175.53808352236646	-18.16909360257072	19.585558	19.08583	18.941422	18.578718	18.337637	17.835861	17.57
175.55137074064442	0.3342699608891871	16.816727	16.181479	16.36142	16.429829	16.397999	16.14672	15.619
175.5609804603061	-2.53146576861475	20.280403	20.512146	19.87022	20.160019	20.141579	20.031372	20.021
175.65814831106258	-20.45605247119997	18.991854	18.29596	17.925095	17.714714	17.63602	17.342842	17.315
175.712294430323	1.516178983683592	20.327808	19.944952	19.936707	19.981285	19.743816	19.675266	19.706
175.8722683259682	-2.0554055350002094	23.38423	22.080292	21.139767	99.0	21.414928	20.841562	20.30
175.8722971552406	-2.0555300405054746	23.380144	99.0	20.875832	20.759037	21.016941	20.915455	20.37
175.94213914323512	-1.2761143494938	21.245798	20.50705	21.005016	21.27337	21.14766	20.592127	20.150
175.9475214240503	1.5149705815849348	21.297352	21.141043	21.046618	19.867298	20.190702	20.031603	19.674
176.03675655570706	1.4057473653603636	19.563124	18.916334	18.53388	18.273018	18.14801	17.83464	17.902
176.21230592350696	1.72354409641951	20.946493	21.13142	20.9866	20.350971	20.568195	20.297352	20.361

176.23234742536548	-17.944273338719373	18.8478	18.559221	18.54964	18.958921	18.817688	19.238749	19.336
176.28348295379152	-0.9883941397936244	20.634706	20.403442	19.971914	19.93528	20.144463	20.032507	20.244
176.29884651458195	-0.90069812354485	22.589134	23.151123	22.185587	20.972158	21.022072	20.376055	20.405
176.3135693424706	-20.746519437466933	18.827707	18.37828	18.201294	18.122242	17.956512	17.806301	17.641
176.35960159169613	0.0041113183584209	17.740704	17.340057	17.21587	17.177881	17.016935	16.925257	16.744
176.50187966637736	0.1769481366071585	21.194107	21.260454	20.636707	21.287	20.693254	20.228582	20.003
176.53216927105808	-0.4579777695914926	19.653429	19.345213	19.215519	18.973225	18.912447	18.799967	18.506
176.6796613966468	1.1885571745316508	99.0	21.399132	21.311491	21.18547	20.38813	20.123257	19.016
176.79778025270713	-0.4516064637217532	19.924904	19.950768	20.067474	20.256575	20.158709	19.837227	19.713
177.07589066324908	-1.6399572049281346	18.247988	17.644798	17.635887	17.629547	17.56578	17.434038	16.919
177.07645388246996	-1.6418060467883486	19.434784	18.903288	19.056414	19.136051	19.081291	19.105267	18.562
177.41500197480892	1.773741489322032	20.065659	20.018902	20.109364	19.79546	20.532269	20.018953	20.006
177.59908479508587	-0.5282934246500881	19.13615	18.63155	18.58576	18.54699	18.476015	18.309181	17.680
177.65124196182416	-0.5685118230038877	18.755089	18.25851	18.437395	18.445408	18.315088	18.251339	17.738
177.65163991073865	-0.5673845606788012	18.730247	18.268295	18.427324	18.327885	18.173578	18.233929	17.780
177.70537423275803	-0.8636364611502556	20.0334	19.895151	20.33833	20.125656	20.153408	20.018604	20.254
177.8042441388274	-22.890342062408017	21.205832	20.641567	20.80392	20.399563	20.038677	19.43388	19.015
177.87268901124386	-0.0593301076444981	21.07603	21.384686	21.029222	20.408188	20.05232	20.033234	19.73
177.88734562043996	-2.372761176366136	19.290741	18.879095	18.802711	19.058353	18.869247	18.65621	18.716
177.88896201644386	-2.3727022231183543	17.976166	17.579065	17.483763	17.920898	17.612103	16.945244	17.197
178.07031354806253	1.3909661333218957	99.0	21.969364	21.092598	99.0	22.477741	20.72748	20.15
178.07224961864256	-2.8840749153908187	20.345108	20.203835	20.54192	20.195625	20.541134	20.038536	19.869
178.11507669366992	-20.10390480837867	17.18961	16.788826	16.722477	16.614521	16.530315	16.38694	16.256
178.15543681764203	-2.4692788013971625	17.3651	16.88866	17.14687	17.391064	17.269634	16.96696	16.643
178.15697510920216	-2.468564555740332	17.393856	17.027828	17.163378	17.335361	17.302982	17.15013	16.953
178.19800706306424	-0.668799198555378	18.84581	18.449661	18.47813	18.617924	18.524534	18.15971	17.326
178.19803381207012	-0.6688280067157996	18.91143	18.350801	18.49842	18.709127	18.547375	18.121227	17.605
178.30862939134568	-3.409047236958316	18.480408	18.035248	18.051733	17.962341	17.85006	17.808645	17.556
178.36942473779808	-3.230237358905925	19.611858	19.077589	19.163435	18.99126	18.993446	18.83461	18.39
178.4393258721732	-2.722344158881375	20.122124	20.403896	20.14457	20.331478	20.239143	20.336136	20.069
178.55129628495746	0.1367777756088964	15.75599	15.496837	15.415285	15.391887	15.379813	15.412392	15.355
178.7357899597813	0.1848611250308225	21.225616	20.60144	21.231989	20.958168	20.42178	21.134544	20.817
178.79661341326374	0.4848658484267525	20.513725	19.740185	20.525623	20.240143	20.259058	19.81443	19.361
178.79873915999408	0.4902688388336615	20.575191	19.673958	20.427492	20.152092	19.950806	19.912022	19.444
179.29940481773815	-2.686921090064285	19.893072	19.326782	19.411179	19.281818	19.35743	19.331562	19.266
179.3012016296504	-2.686482916082229	19.775827	19.194035	19.11845	19.195274	19.355545	19.24854	19.047
179.36682377284328	-19.624040211696983	16.738894	16.306568	16.45553	16.486805	16.424942	16.368124	16.14
179.40451295413072	-2.027027964558633	20.268703	19.943996	20.114368	19.967728	19.82571	20.033146	19.97
179.4045305314517	-2.026996683135112	20.293676	20.109678	20.078526	20.405567	20.116035	20.08588	19.99
179.4500979791226	1.722464633451602	19.377548	19.235622	19.15575	19.488813	19.252699	19.334229	19.34
179.47609913312544	-1.6377672684560611	99.0	22.086409	99.0	25.129833	99.0	22.153313	21.753
179.48620454609028	-20.565663973239875	20.298063	20.041704	20.182796	20.109928	20.121044	20.068449	19.561
179.53333868601857	-17.893384995930617	18.983469	18.472061	18.533615	18.287926	18.20074	18.112148	17.901
179.59916114110445	-19.517546281041724	18.352509	17.814745	17.758356	17.59161	17.486935	17.357967	17.188
179.74240913634958	-19.02992833661004	17.81333	17.373869	17.571983	17.67984	17.580914	17.468313	17.16
179.8478669187984	-1.7228572218896734	20.42714	20.138456	20.170609	20.19209	19.98906	19.815832	19.84
179.87055152576207	-19.25634139982329	18.734001	18.310705	18.303402	18.279156	18.191278	18.156988	18.003
180.08253579679277	-20.802092442909533	20.614084	19.824667	20.16839	20.217876	20.024773	20.006319	19.528
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180.0906960738449	-2.72525835885637	22.816006	21.674263	21.090069	21.222158	20.769886	20.690521	19.592
180.1095757612321	-1.1019334954271696	18.344444	18.105305	17.995176	17.994059	17.86121	17.840832	17.727
180.15952618608105	1.2129112212203663	19.754017	19.519112	19.554691	19.781118	19.600208	19.607595	19.627
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180.1988428326189	-0.02340688109002	20.133251	19.885323	20.106247	19.45073	19.59285	19.63851	19.25
180.29522824339665	-1.2972657148586302	18.918375	18.478039	18.458061	18.39903	18.316235	18.205284	18.114
180.34692325828544	0.4745788784794196	18.414946	18.263039	18.240097	18.486599	18.465328	18.436304	18.373
180.3769799367477	-23.31854795335849	20.122871	19.543274	19.676758	19.60671	19.624487	19.51264	19.341
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180.4603613485204	-18.86737026502464	18.410507	18.090548	18.0142	18.02005	17.989668	17.916605	17.80
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180.4635139848257	-18.8625819554819	17.231833	16.941227	16.833206	16.839123	16.816885	16.894896	16.843
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180.4678191428082	-18.87206620305753	17.874485	17.654716	17.619822	17.590141	17.532236	17.532074	17.471
180.47066639368427	-18.86764989585912	18.224304	17.72346	17.621695	17.422127	17.209538	16.790802	16.598
180.4707539538797	-18.869071106666347	16.854996	16.646807	16.562164	16.552856	16.4706	16.415365	16.363
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180.70997875542824	0.3254128494396162	22.442297	22.579315	22.205854	20.6031	21.220192	21.010866	20.387
181.31583811226784	-2.706276551980267	18.543785	18.524078	18.538334	18.461569	18.439888	20.044075	18.604
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181.7517098625927	1.1990112046487067	19.546556	19.663471	19.04055	19.309776	19.219814	19.33358	19.337
182.33562177580043	-0.4820361729402547	21.31383	21.429401	20.58124	20.680761	20.03229	19.806597	19.163
182.545072752764	-0.6527062334835679	19.626934	19.126925	19.048038	19.030712	19.337765	21.01912	19.346
182.6100536766531	-0.0870043020990194	20.745415	21.45568	20.898905	20.77608	20.985058	20.451899	20.140
182.68163468989783	-0.6523719250391294	18.979662	18.65686	18.589684	18.878891	18.857021	21.430365	19.593
182.7543746779469	1.3402916186010196	20.444815	20.153137	19.6301	20.164059	19.925144	19.945345	19.71
183.0613723384793	0.0723961267201827	18.141014	17.652908	17.502697	17.552475	17.422272	17.300854	16.758
183.06624544494187	-0.5647749352872001	20.559986	20.122684	19.86613	19.932777	19.85234	19.714066	19.485
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183.27052753312853	-0.6503293355092394	22.323353	21.461552	20.871395	21.382553	20.376797	20.17863	19.858
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183.81343790615867	-1.5946745490378629	19.091963	18.870872	18.890852	19.050621	18.943077	19.159666	19.057
183.91446236872125	-2.363112482714665	21.008402	21.82978	20.737297	20.676212	20.896591	20.62874	20.52
184.0314339047394	-2.4326620218980715	20.745504	20.915134	21.211529	21.16209	20.331978	20.348978	20.046
184.5002257605925	0.4326907734274652	20.282446	20.268593	20.632595	20.636322	20.47853	20.436995	20.32
184.52944788519463	-3.1080109031254355	21.835974	21.800222	21.88578	21.56707	20.502018	20.506771	20.361
184.5794111776165	-14.20553320828172	19.192196	18.61633	18.49825	18.602308	18.512793	18.414974	18.039
184.579419031614	-14.205547557474516	19.108906	18.62788	18.59362	18.566463	18.47868	18.386024	18.102
184.73251321873693	2.0005938638657152	18.490171	18.198433	18.373615	18.390635	18.328289	18.355433	18.269
184.9269721119905	-0.3059539785935566	19.559713	19.560541	19.7091	19.83842	19.666569	19.781626	19.705
184.97137095309444	1.77334461639504	17.908978	17.442299	17.388336	17.36149	17.3101	17.338427	17.127
185.0155358422371	1.1089971952641655	22.441633	23.059544	21.424183	22.664053	21.648918	20.877207	21.14
185.04802604861416	1.9586348136308644	19.870804	19.357544	19.3306	19.38762	19.381222	19.256258	18.60
185.11998162334305	-1.8391750369277204	19.851131	19.493494	19.352621	19.315159	19.2624	19.154919	19.00
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185.37906214223312	1.124474721489336	18.145435	18.121027	18.183933	18.340117	18.22086	18.272114	18.261
185.39336391937871	-14.964030135530916	20.36859	20.347973	20.481483	20.368862	20.199562	20.351555	20.286
185.48261972911092	-1.593344147053986	20.105625	19.531029	19.335884	19.654194	19.38517	19.06768	18.329
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186.051943489446	0.5669364629276971	20.731844	20.350075	20.114666	20.008305	20.057348	20.208382	19.978
186.08805453702857	0.3984481006440221	20.67571	19.998692	20.473328	20.701805	20.136086	20.000328	19.89
186.4280748118269	0.5727372676461775	16.02449	15.644358	15.751676	15.670586	15.622963	15.615408	15.40
186.4474227096049	-1.3349274091067191	21.457714	21.318295	21.856419	21.57993	20.741741	20.874826	20.856
186.5943422902263	-1.2547941267807978	19.809494	19.234753	19.408646	19.741417	19.487635	19.390665	18.611
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186.6069592196776	1.267941658397558	20.276806	20.018196	19.738281	19.743923	19.05345	19.584936	19.68
186.67269731032096	-0.3347511966887692	19.56058	19.257568	19.444332	19.559261	19.406103	19.375797	19.38
186.7689240600145	-0.9059699735306485	19.017946	18.642355	18.627045	18.509626	18.534725	18.423664	18.242
186.7690053713781	-0.9061085611109012	19.197731	18.788631	18.721394	18.668182	18.5254	18.510498	18.30
186.77970923418985	1.1364780564297168	21.379528	20.715347	20.416882	21.600433	20.767012	20.711733	20.884

186.9419456708534	1.6004126119631985	19.777828	19.350803	19.66241	19.506775	19.607254	19.6109	19.667
187.0663127889704	1.828815876976476	19.814854	19.313055	19.354618	19.337404	19.156456	19.195272	19.161
187.21391718345924	-2.441436093650128	20.611897	20.619764	19.870487	20.638657	20.187418	20.127464	19.861
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187.44305324875543	-1.2950038406448354	20.707453	20.379473	20.311811	20.249147	20.60588	20.033302	19.907
187.4953452683044	0.0272052015597826	19.90839	19.269215	19.288021	18.849373	18.600403	18.116838	17.86
187.72629290525728	0.9640254113499284	20.281017	19.910086	19.782654	19.53644	19.46988	19.411596	19.178
187.95005920551247	-2.970279786813015	18.49998	17.946804	17.698397	17.677826	17.582668	17.504562	17.291
188.01126587842555	0.5235179491769296	21.641354	21.070852	20.708233	20.986588	21.156956	20.705055	20.870
188.0984798952765	-1.7400910842643869	18.039701	17.547031	17.431753	17.362347	17.24802	17.127296	16.821
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188.17323029456747	0.0573372798919609	20.100327	19.578892	19.4971	19.11769	18.709023	19.12056	18.35
189.26006228209985	-15.278740375443848	19.726835	18.953026	18.8354	18.745018	18.546598	18.428152	18.269
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191.1121599071608	-12.876636746547932	18.932337	18.39347	18.41735	18.367872	18.261997	18.05925	17.813
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194.7464380329297	-13.86174217154326	20.764538	20.296926	20.169466	20.408619	20.534765	19.756956	18.995
194.75339729526405	-13.57832034488012	19.634785	19.367744	19.203129	19.764915	19.484324	19.700903	19.47
194.76947807533804	-14.773193673700838	19.869892	19.39223	19.533619	19.286434	19.047855	18.711983	18.525
194.88643900048527	-15.23870530424191	16.972359	16.689445	16.816916	16.872791	16.846575	16.755608	16.353
195.01265981525043	-15.204780538418568	18.967327	18.442057	18.372791	18.395405	18.23657	18.158009	17.931
195.1637302491048	-14.666465631319904	17.078377	16.605251	16.53589	16.522495	16.41534	16.33154	16.162
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195.68164279128675	-13.931326571318332	18.339754	18.094866	18.096401	18.104895	17.959831	17.923235	17.857
195.88935067936143	-14.323090018355355	18.9769	18.485952	18.432842	18.484922	18.376802	18.185217	17.590
196.2068792963303	-13.191177561311532	17.785027	17.38582	17.179955	17.112654	16.973969	16.872747	16.731
196.2182957489161	-12.37186182183362	19.474962	18.779587	19.24071	19.083452	18.923729	18.719254	18.076
196.49382904825976	-12.669019185775264	19.754154	19.19712	19.258314	19.246298	19.271774	19.019852	18.857
197.5365518439323	-12.20565697288585	19.27222	18.64541	18.404812	18.458504	18.336563	18.282858	17.973
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198.1183640318735	-10.5901002725042	19.609634	19.077845	19.13167	19.145584	19.073666	18.937819	18.843
198.40060156082	-12.470900254658584	18.481049	17.956554	17.930462	18.128061	18.09613	17.89708	17.159
198.7832210949353	-12.518085580918816	19.417524	18.858599	18.740387	18.661968	18.557661	18.426804	18.001
199.4203839129064	-10.183193478269848	19.184816	18.66526	18.692898	18.581429	18.555262	18.42827	18.277
199.42655914037883	-0.3376844496286302	25.875816	22.259535	21.666803	21.63153	99.0	22.862782	21.98
199.4331632480484	-1.000304791159635	18.700853	18.29549	18.292747	18.78373	18.564894	18.09292	18.302
199.8428608076528	-15.156551152235588	18.032825	17.610939	17.498764	17.341715	17.212444	17.181913	17.038
199.9279871875005	-11.474580164900791	18.594336	18.109947	17.941484	17.959217	17.84466	17.713034	17.575
199.9899853471545	-0.5796217824328943	20.186396	20.004951	20.187418	20.417747	20.498032	20.13897	20.354
199.99667654428632	-12.487991060254044	17.94038	17.653679	17.8003	17.82204	17.726875	17.828003	17.77
200.0847263890424	-12.571681196376176	17.302385	16.828814	16.684883	16.523731	16.45265	16.377945	16.162
200.0977807916915	-0.7918937289501875	25.008417	24.706688	99.0	23.573925	23.542973	21.364037	20.195
200.39451837704632	-15.18209388051804	17.682592	17.243473	17.105728	17.044859	16.971672	16.918608	16.750
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200.93371811191045	-12.053272612599368	19.023664	18.369902	17.451172	17.909502	17.88958	17.763216	17.61
201.45279121661528	-11.610508041620404	18.696358	18.365057	18.076256	18.67246	18.316654	17.697054	16.481
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201.5212567425004	-9.370169275455012	19.95824	19.392235	19.276611	19.177223	19.43348	19.053385	18.710
202.99778408537745	-9.884062720187078	17.861385	17.211693	16.856009	16.590815	16.472647	16.256992	16.218
204.0776714159391	-7.3810632714249085	18.00182	17.735756	17.920746	17.972406	17.8807	17.921288	17.901
204.1377042494816	-6.47921900688106	21.83006	21.353458	20.926994	20.607273	20.677616	19.82641	19.32
204.7882876783339	-8.327997709939716	18.269459	18.212511	18.174755	18.215584	18.158003	18.17942	18.117
205.2707900815086	-7.018268794365892	21.175787	20.434101	20.77264	20.464561	20.282581	20.24694	19.917
205.8792268775973	-15.316371740752832	17.684706	17.38095	17.277676	17.282232	17.26458	17.16882	17.101
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206.66333089551333	-9.643338332630568	18.375038	18.03476	17.704798	17.48944	17.31773	16.997187	16.774
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208.0162602836453	-2.122849268399833	20.487625	19.984224	19.98577	19.6909	20.127777	19.609352	19.648
208.0176716348379	-2.1302616063806163	20.360712	19.537706	19.752783	20.448885	20.001358	19.827217	19.327
208.5470343354216	-3.4408967610650127	19.64944	19.057373	18.778372	18.764381	18.607365	18.58773	18.216
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208.89159973272297	-5.971399339776448	20.078995	19.48513	19.326622	19.463955	19.320412	19.415874	19.146
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208.94449637980523	-6.011323983078441	20.726406	20.011242	20.22393	20.613968	20.270626	20.076174	19.258
209.0116324685152	-2.4398085262225853	20.657887	20.706295	21.312666	20.987698	20.69801	20.963877	20.500
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216.795092182775	5.133141307382639	20.373749	19.910366	20.025146	19.768574	19.7239	19.698606	19.60
217.2307884592734	5.0060874486010265	20.069324	19.971699	19.932112	20.195938	19.941101	20.062588	20.071
217.2310767118411	5.0055279363461525	20.329605	20.151497	20.065937	20.252522	20.3117802	20.311079	20.08
217.430980101215	5.356359632037527	22.0915	21.791775	21.003714	21.066929	20.919872	19.78768	19.410
217.4943714069119	4.769808218972206	23.293076	99.0	24.486506	23.068092	24.831806	21.724262	22.082
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223.43549771425327	4.946107899138475	23.520914	22.095716	21.9789	20.589172	19.908213	19.932402	20.046
223.89042173389376	4.778676422249849	20.594608	20.462397	19.910076	20.048405	20.011198	19.599482	19.393
300.4321955778412	0.8217833390436116	19.648949	19.27309	19.529509	19.809547	19.529156	19.523705	19.721
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302.7008333786705	-0.2177414034676869	18.832045	17.705244	17.236462	17.010288	16.891104	17.353691	16.643
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305.64797588529285	-0.6694194677482896	19.23085	18.346039	17.96097	17.770298	17.734516	17.633295	17.489
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307.05008700522615	0.288400031713299	18.648752	18.172045	17.7872	17.546488	17.422337	17.286594	17.100
307.2783691077352	0.9148870344062292	20.79459	20.472681	21.288122	19.929564	19.971962	20.011665	20.28
310.91682422695794	0.481551561964735	19.375893	19.27164	19.455013	19.417177	19.154716	19.349209	19.299
311.6087878150387	0.3938280343112397	19.982796	19.316072	19.375916	19.401075	19.03231	18.771515	18.50
311.8364843167464	0.0021704620321628	19.682049	19.906944	19.79963	20.085146	19.976696	20.442486	20.407
311.8365168802931	0.0021268467006492	20.27394	20.141737	20.029287	21.355536	20.407652	20.708832	21.478
312.2956269426095	0.265970422493022	19.502487	19.061068	19.341244	19.278011	19.250103	19.313698	19.226
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313.3198559349733	0.9892076810353208	99.0	21.498085	21.51196	99.0	99.0	21.017244	20.10
313.466816984702	-0.2670765601766264	19.686878	19.132528	19.311354	19.2926	19.2288	19.080782	18.977
314.0606317101171	-0.680733084738148	21.159618	20.975029	21.0573	21.515957	21.163042	20.838202	21.076
314.302863294349	0.2031735829473498	20.195654	19.996515	20.49167	20.038883	19.973753	19.926065	19.930
314.4198074848838	0.9052857685742688	21.830828	21.800228	21.743107	21.321655	21.11817	20.814583	20.60
314.5268677152485	-30.1383582004064	20.454922	20.243736	20.437595	20.077885	20.622326	20.156643	20.000
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315.05879832773167	0.7460919799647099	18.220266	18.56082	18.724003	18.837536	18.709839	18.608065	18.544
315.48312134293826	-0.5235874873138652	23.672825	22.335392	99.0	22.81174	22.07117	21.295862	20.852
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315.7592781700893	-45.24473926016992	20.004875	19.432266	19.243792	19.083733	19.126905	18.983234	18.313
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316.03549398691706	-43.53423041944633	17.98658	17.242344	17.404654	17.452602	17.40041	16.92162	16.177
316.04653712211586	-43.592725469851146	17.869774	17.55672	17.24769	17.146364	16.999481	16.829033	16.662
316.08943735381246	-30.197214902706765	21.729023	21.98216	20.442024	20.54319	20.549591	19.519257	19.071
316.2304449432887	-0.5893867983932235	19.830006	19.491098	19.322739	19.424667	19.22334	19.31692	19.267
316.3361978919587	-45.98869609290722	20.107265	19.482197	19.281845	19.0522	18.798971	18.822758	18.592
316.41115448294687	-42.7812242143475	17.962954	17.298344	17.015549	16.85263	16.675777	16.472431	16.28
316.47319569385303	-37.14456181858315	16.42494	16.430645	16.393665	16.536879	16.53376	16.472448	16.822
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316.79991779423176	-47.55699311008755	18.79662	18.430214	18.294722	18.278877	18.174946	18.108784	17.834
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318.00385158352736	-0.280345841969967	19.452042	19.039309	19.022516	18.6059	18.618792	18.254951	17.79
318.10247638771125	-41.48147711626288	17.620697	17.27629	17.431637	17.504526	17.427097	17.507923	17.44
318.3673788604048	0.0590671476084678	20.573662	20.306232	19.748169	19.224913	19.021849	18.945652	18.42
318.8297135149132	-33.22628044991965	17.763245	17.387287	17.261469	17.180016	17.027632	16.957031	16.792
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321.7844092060996	-30.9523274970352	19.734142	19.231956	19.19019	19.148857	19.036747	18.891354	18.46
322.4759106821289	-1.0564795011399617	21.816303	21.204327	21.115993	21.507372	21.178743	21.17089	20.723
322.8730471709395	-45.697352338099286	19.253197	19.066833	19.257523	19.25464	19.099625	19.19132	19.148
323.1762194624441	-1.0525538970193808	20.429543	20.26434	20.15118	20.19324	20.20388	20.020332	19.833
323.18856454382785	0.0296602067769526	18.193909	18.998583	18.507286	18.895386	18.254898	18.680725	18.754
323.408936906668	1.4413770493499043	19.178493	18.548788	19.321018	18.841516	18.996649	18.536587	18.96
323.72952597635833	0.1824349898807966	99.0	23.236696	20.27442	19.670969	19.582047	19.270477	18.836
324.20730055187585	-1.481159088195661	99.0	20.105087	19.470957	19.225597	18.76763	18.211832	17.544
324.53121345495185	-45.13834354299933	23.341919	23.355152	22.600405	99.0	99.0	22.012041	22.139
324.57901744173665	1.2062510372667887	18.849943	18.351454	18.594212	18.72892	18.55871	18.701168	18.574
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325.2768379376971	0.7926481060166569	20.521936	20.356617	20.720074	19.592796	19.632906	20.072735	19.892
325.4280346483323	0.7597010317264318	21.425274	21.308697	21.374891	21.39954	21.680742	21.13394	20.675
325.47932878054104	-1.292825833976646	99.0	99.0	20.90391	21.086803	21.27356	20.164288	19.663
325.479329853818	-1.292849791540993	23.497677	99.0	20.593538	20.423693	20.401958	20.643063	19.798
326.0956022427804	-29.91639450734865	22.51054	22.676683	23.009441	21.204483	22.366066	21.146517	21.688
326.2329872209474	0.3850203444962297	21.193954	21.285172	21.965094	21.00112	21.098465	20.826744	20.88
326.4167001057865	-29.32690805408077	19.437794	18.850342	19.113686	19.05526	18.784925	18.633448	18.409
327.1275218035224	-0.7979329669827752	21.749092	21.993923	20.997635	20.986004	21.284733	21.261002	21.462
327.127535195112	-0.797904422039106	21.96176	21.633818	21.94574	22.73768	22.108326	21.432835	21.321
327.5112425223878	1.2288440704579693	21.649673	21.691431	19.765429	19.776981	19.971031	19.321075	18.56
327.54385873207247	-0.1668265647596742	19.368793	18.906378	19.295036	19.151392	19.150337	19.126701	19.046
328.2731418249827	-31.471640527742185	18.383516	17.767067	17.841465	17.938904	18.015337	17.698605	16.804
328.2731418249827	-31.471640527742185	18.383516	17.767067	17.841465	17.938904	18.015337	17.698605	16.804
328.2731418249827	-31.471640527742185	18.383516	17.767067	17.841465	17.938904	18.015337	17.698605	16.804
328.2731418249827	-31.471640527742185	18.383516	17.767067	17.841465	17.938904	18.015337	17.698605	16.804
328.2731418249827	-31.471640527742185	18.383516	17.767067	17.841465	17.938904	18.015337	17.698605	16.804
328.57500430647343	0.9422073085758816	18.25606	17.73635	17.635374	17.684563	17.614357	17.562885	17.335
329.0576398034554	-1.1618941444509447	20.254251	19.68459	19.639256	19.377903	19.53898	19.192886	18.622
329.0576982984844	-1.1619911379394898	20.130873	19.526188	19.479277	19.408611	19.303335	19.088758	18.58
329.08245077543467	-1.1676749952103018	20.328945	19.447699	19.98529	20.054066	20.554106	19.52106	18.240
329.0825336876782	-1.167693306004015	20.505777	19.535744	20.002626	20.351149	20.339891	19.61446	18.27
329.3370362394045	-25.133993290826115	20.541	19.936993	20.14632	19.718071	19.95662	19.671915	19.399
329.6011751965016	-0.737145415174484	21.304167	20.689135	20.909544	20.931896	21.529938	20.147696	20.312
329.76204963872004	-0.5550013061974669	20.200144	19.75396	19.936632	19.455719	19.664818	19.22604	19.128
329.7629603765794	-1.9550737068589068	18.84726	18.355404	18.224152	18.032475	17.872902	17.62685	17.375
330.4586482938667	-0.7074127748175637	19.352356	18.769888	18.672413	18.566498	18.5581	18.350998	17.849
330.5294901692158	-26.44390115708122	20.500381	20.45043	20.991575	20.310696	20.646793	20.13124	20.060
330.8130711615091	1.2891533854468642	16.458282	16.473541	16.482662	16.547413	16.591558	16.803116	16.851
331.22366426801165	-25.051456106463764	20.554134	19.774828	19.733456	19.838821	19.68841	19.727837	19.303
331.37225331383246	-0.5196269942518518	19.779865	19.575947	19.606314	18.885618	18.658035	18.996693	19.157
331.7304425939274	-31.052944378400603	19.682568	19.044346	18.76726	18.740759	18.548676	18.242739	17.969
331.89396381531327	-28.65815178172343	20.315033	19.814178	19.470724	19.74728	19.965652	19.38705	18.23
332.1018041812308	-29.05100572704748	17.594341	17.125515	16.991823	16.921879	16.779778	16.645687	16.486
332.21648908406854	-30.64966912723208	22.101189	21.119556	20.886454	20.788746	21.241676	20.923752	21.149
332.2165318654766	-1.1010232176217527	18.765472	18.292253	18.466774	18.593342	18.46107	18.58442	18.449
332.21654479357403	-1.1010212789856892	18.641483	18.18602	18.45527	18.5016	18.346493	18.436134	18.334
332.2329099311068	-27.22278199790022	18.241735	17.81569	17.696892	17.500725	17.380848	17.17297	17.041
332.3293752575985	-24.12012102380704	20.1959	19.701807	20.063095	19.83827	19.837238	19.747543	19.51
332.34547450375544	-25.417946056108004	18.022354	17.638325	17.457245	17.311401	17.09653	16.987827	16.774
332.45263484436884	-30.23217545253064	19.03305	18.944643	18.835907	18.722084	18.6156	18.613972	18.475
332.4639565862639	1.1500007990678438	20.831081	20.518543	20.955532	20.037794	19.922785	19.448835	19.115
332.4773666618215	-1.454892271729591	22.74758	21.943682	21.02951	20.835886	20.58337	20.27464	19.742
332.50311376214466	-31.23332648999496	21.271248	21.437366	22.116364	21.934568	21.203896	20.990019	20.640

332.51558209616104	-25.335365131244853	19.831928	19.277618	19.223604	19.10842	18.963303	18.828508	18.581
332.5240068270393	-27.91075708397664	20.798483	20.406918	20.28819	20.624054	20.65477	20.39912	20.527
332.7416878016213	-25.07531023085714	17.236553	16.73903	16.73525	16.732794	16.60332	16.623493	16.283
332.7430386884259	-27.658157768445044	20.18319	19.960194	20.257246	19.963974	19.734331	19.896328	19.654
333.17320112679323	0.5119642601996512	20.379177	19.974018	19.85369	19.64703	19.949957	19.931274	19.512
333.3985380422876	-28.42824210005132	19.734585	19.641512	19.627466	19.4113	18.706089	19.139385	19.311
333.51191857192214	-27.53928600571248	19.865646	19.366892	19.19563	19.046722	18.949982	18.81429	18.395
333.5119857829216	-27.53930260557384	19.976719	19.366566	19.199944	19.079166	19.010815	18.888138	18.385
333.5134692326156	-29.38272127795172	17.995043	17.752209	17.556046	17.445238	17.330212	17.197422	17.07
333.5212380480937	-29.381350935720462	20.068743	19.506275	20.027863	19.621788	19.737057	19.423822	19.180
333.600966286032	-29.98098137914205	17.209856	16.730064	16.637888	16.460585	16.30481	16.171106	15.998
333.6746944454729	-28.44433992901234	19.157505	18.68194	18.63886	18.549755	18.485909	18.334236	17.965
333.69650411507115	-29.68677871511806	20.252647	19.775677	20.12474	19.949509	19.559652	19.60368	19.381
333.8212699349557	-28.89929996827705	21.31696	20.98459	21.613323	20.970295	22.476006	20.851171	20.465
333.88574209843875	-28.301075647502863	18.066174	18.108084	18.158804	18.234013	18.218071	18.205105	18.174
334.1253072836468	-29.01480498338059	21.56544	22.45222	21.331045	21.225397	21.343946	20.704802	20.268
334.2771669200802	-30.579476065999444	19.863834	19.243364	19.701702	19.753855	19.692768	19.62994	19.67
334.3435194955581	1.0767543256819685	20.617092	20.22575	20.623823	20.274485	19.697956	20.138876	20.138
334.421449319186	-27.365163382540192	18.541111	18.03218	18.006382	17.848404	17.774736	17.62525	17.431
334.5579398251045	0.2736951228444171	20.725449	23.295254	21.754194	24.38073	20.923668	21.432766	21.008
334.56262843755	1.254694273842988	18.580994	18.265194	18.09918	17.830658	17.723465	17.671621	17.378
334.57190645739905	0.6065838369084469	99.0	23.089006	20.752857	99.0	22.034794	20.731842	20.63
334.58077291303573	-27.26228422509564	19.925705	19.583439	19.848743	19.74416	19.416924	19.722582	19.564
334.6947482712885	-1.188558994516001	20.642159	20.518456	20.42545	20.514328	20.138042	20.270317	19.975
334.69475415064494	-1.1885577406117744	20.685913	20.33455	20.351048	20.320354	20.394266	20.142488	20.048
334.71939499895126	-1.0529142510236456	20.512787	20.237717	20.140663	20.295034	19.93386	19.957514	19.622
334.8579955716732	-30.852129377014343	20.914194	21.187405	20.735744	20.696894	21.02615	20.71048	20.599
334.9364411418472	-0.2444533826638444	21.3238	21.486656	20.692493	20.89273	20.864773	20.433739	20.230
334.93782729725075	-29.57039409080591	20.525799	20.34188	20.731808	20.47775	20.314804	19.721779	19.58
334.9744213770292	0.4846689985595231	21.23145	21.34753	20.09486	21.047281	19.747665	19.58379	19.798
335.08900553863754	0.6779085075975249	20.77084	22.181347	22.557611	20.896257	21.173443	20.751999	19.861
335.3067522132758	-28.07246239885318	19.970057	19.605595	19.9902	20.032425	19.865389	19.786322	19.613
335.72883636182854	-30.70788858469623	19.295673	18.795162	18.757828	18.633678	18.644478	18.595066	18.261
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335.88681821013813	-1.10412204251795	20.263588	20.186878	20.058247	19.68931	19.143238	19.54586	19.56
335.90012802575814	-28.527653500762096	21.294098	21.084661	20.695097	20.535229	20.843264	20.717644	20.554
336.01397097341777	-0.9567096099850134	19.667635	19.453205	19.52455	19.367388	19.456322	19.528378	19.50
336.01401051604205	-0.95669696999045356	19.865261	19.556114	19.853334	19.547115	19.361368	19.651928	19.526
336.0677440421202	-29.40602881395364	20.067167	19.972084	19.562363	20.314833	19.845455	20.038948	20.030
336.912099323913	-31.136207086254505	19.871572	19.450245	19.237164	19.150505	19.317501	19.152199	18.89
337.1046549602956	-0.3714489675823685	20.962578	20.47118	20.309229	20.512533	20.342785	20.71666	20.575
337.19918624431745	-30.91199843220645	19.748589	19.26162	19.047726	19.353298	19.334167	19.163708	18.437
337.1992648299098	-30.911989220539105	19.83289	19.385004	19.353102	19.44477	19.368786	19.260372	18.62
337.22360618425245	-30.980939741660382	17.841534	17.40406	17.238712	17.333538	17.193909	17.203926	16.91
337.22360894565986	-30.98095563687505	17.948002	17.487413	17.361025	17.330242	17.25209	17.245064	16.961
337.3458366571309	-2.011785900315515	26.268253	23.2678	22.100986	23.860474	21.975504	21.119923	19.701
337.48557309949206	0.5240235390794395	20.00661	20.00759	20.314407	20.174156	20.563	20.128872	20.256
337.5076760184757	-29.597960152831284	20.539501	19.978352	20.139557	19.908503	19.815239	19.720806	19.70
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337.653463904362	-0.1099571744851075	19.232645	18.78579	18.71311	18.87171	18.705122	18.428497	17.748
337.7750079939556	-0.1955294013694825	19.811098	19.40311	19.64211	19.532427	19.311024	19.307606	18.968
337.80812689962085	-31.33455219401752	18.823704	18.896534	18.88786	18.997402	18.894508	18.842434	18.840
338.2155980841278	-30.54711277145381	17.92139	17.451529	17.712349	17.87841	17.785751	17.957096	17.974
338.4273343986453	-30.32651312377564	19.926918	19.906933	19.924263	20.19223	19.951488	19.80186	19.56
338.5277783244117	0.0224447956398556	99.0	99.0	22.535429	99.0	20.298452	20.22638	19.76
338.66637521384126	0.6909664418071105	18.294277	18.220833	18.19443	18.598942	18.343256	18.582764	18.380
338.73567173096313	-31.145574300500385	19.394707	18.919315	18.710747	18.713493	18.5872	18.496933	18.223
338.73569433672816	-31.1455850268799	19.426252	18.98133	18.754448	18.635914	18.621384	18.476562	18.195
338.78506511786827	-0.8998369935534453	20.596087	20.901154	20.763298	20.506685	20.257004	19.913912	19.4
338.785109135079	-0.8998316294838345	20.890814	20.687716	19.957449	20.399118	20.094154	19.953869	19.612
338.88432907328246	-29.77583940043047	20.366179	20.014984	20.384583	20.135277	20.024508	19.771648	19.525
338.92933238127915	-0.9101766325827358	20.862732	20.2796	20.10401	20.942116	21.195107	20.19907	20.183

338.92938653521645	-0.9101558150095174	20.943243	20.582947	20.58083	20.827757	20.788746	20.392052	20.49
338.9294202112855	-0.9100982563435506	20.79287	20.900934	21.087849	21.110905	20.46106	20.466885	20.707
338.9330431386031	-0.6589082844776932	24.548845	21.29924	21.368832	19.598606	19.244268	18.95677	18.778
338.9369542908973	-26.040945424398046	19.302929	19.069798	18.934809	18.75877	18.622385	18.535566	18.431
338.9391682825249	-26.03634410855905	18.3984	18.134647	18.251831	18.17503	18.048075	18.049576	17.989
338.942864761339	-26.074740893365583	18.615156	18.208902	18.446035	18.376791	18.295431	18.402546	18.28
338.9509617589531	-26.02333197997694	21.173481	20.520166	20.918207	20.972137	20.670887	20.694803	20.228
339.139729783869	0.4480037094611175	19.63932	19.51648	19.546444	19.604961	19.572905	19.598785	19.595
339.20666171031564	0.9038310163367896	21.435831	23.993168	21.49548	21.588688	21.691103	21.050285	20.38
339.3495140772359	-1.0219920514291434	21.087149	20.312832	21.382967	21.389164	21.312553	20.827139	20.170
339.3744168628378	-1.09702098520342	20.66574	20.411228	20.032967	19.931255	19.799217	19.837517	19.548
339.5968891921001	-0.952268013442764	17.99057	17.543129	17.82176	17.866417	17.749638	17.854343	17.819
339.5969264365535	-0.9522370681869864	18.653595	18.065145	18.407806	18.574139	18.408466	18.599718	18.60
339.6845594683822	-0.948694319373839	19.795774	19.637096	19.76396	19.91589	19.44207	19.560654	19.68
340.3312015654902	-39.97314857397814	20.500826	20.054697	20.065958	20.12928	20.393032	19.918224	20.150
340.4562435334129	-30.329015431975083	20.976034	21.136337	21.069193	20.80177	20.896797	20.814758	20.369
340.81825118013086	-39.86108916393093	20.441092	20.155485	20.160307	19.938076	19.76232	19.897953	19.841
340.8308173956169	-39.87900062583571	18.765066	18.316227	18.473804	18.764938	18.662691	18.643997	18.12
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340.96755531580084	-0.3832981583866523	20.24839	19.879843	19.638357	19.66398	19.43423	19.381914	19.108
341.3799824113044	-0.7526108924743485	20.15395	20.007	20.451185	20.681248	20.341541	20.043013	19.989
341.3799836615205	-0.7525947660724432	19.961748	19.988262	19.77144	19.938765	20.070171	19.916544	19.93
341.4164203070588	-0.4054482118161328	23.168085	21.524567	20.471712	20.101341	19.591965	19.342678	18.723
342.4836663184702	0.038431612886782	99.0	21.32353	20.718998	20.548227	19.749462	18.883163	18.447
342.55381866523845	-0.666369376718931	21.402012	21.423403	21.042973	20.997837	21.008324	20.900791	20.579
342.95730339479854	-0.4698259059306293	22.955803	22.152143	21.111607	21.24644	20.54239	20.74853	19.576
342.9879147578966	-29.414118119813367	21.859734	21.17837	21.26253	20.353754	21.157175	20.887466	20.32
343.2393387782164	0.4587823345606925	20.234575	20.423332	20.44969	20.759556	19.953514	19.962273	19.809
343.4706720102698	-30.162151096626257	19.68581	19.392944	19.835129	19.894516	19.559261	19.871483	19.963
343.54646400880233	-31.45314972730561	19.123016	19.166363	19.209599	19.14899	19.175735	19.234583	19.238
343.5498267824822	-0.8303920878390473	99.0	22.554794	22.503902	22.250004	23.913055	21.643997	20.994
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343.76622684097015	-30.32036536315227	21.139341	21.037724	23.304813	20.950928	21.257917	21.088835	20.75
344.7838160610223	-31.454652481082007	20.23195	20.42776	20.218302	20.683582	20.187271	20.531954	20.338
345.12539458156243	-0.5016202410575213	20.129997	20.244976	20.254679	20.04882	20.056597	19.962204	19.574
345.5049924642404	0.5131468261640252	19.391598	19.46907	19.457357	19.683907	19.42474	19.549065	19.622
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345.8183544369748	-0.2031687049072709	19.699047	19.798336	19.909426	19.579155	19.719006	19.383873	19.427
345.9651406629765	1.11426658072561	17.690378	17.6743	17.94323	18.30909	18.298286	18.337246	18.386
346.1180884490532	0.950341888510796	20.016867	19.924856	19.738178	19.878992	19.754395	19.893171	19.792
346.1839995707146	-1.047637756170335	20.186165	20.07165	20.357826	20.38396	20.064283	20.1483	20.047
347.04492000641267	-1.299588506149179	19.293907	18.725643	18.739544	18.536646	18.360949	18.235445	18.001
347.231188850614	0.6182549476788003	18.037512	18.046118	18.283634	18.251324	17.683746	17.83242	17.682
347.2316580483845	-30.85783430936128	18.908728	18.420765	18.31343	18.007141	17.91569	17.609924	17.437
347.3096188733344	-30.986794418426523	19.122955	18.937397	19.260098	19.425285	19.364893	19.379522	19.474
347.44230168607083	0.0136411947639146	19.099495	18.743095	18.865568	18.805738	18.727854	18.708315	18.648
347.4423475040321	0.0136153759642055	19.115383	18.66745	18.885777	18.804716	18.65346	18.671017	18.634
347.67494008100954	-1.1633342696409468	20.165329	19.488243	19.410107	19.542925	19.509659	19.30631	18.977
347.8963319528839	-31.445592377850765	20.20836	19.997559	20.306759	20.1599	20.129555	20.083668	20.069
348.0373247446722	-31.070356404741503	20.634201	20.403416	19.939182	20.183887	19.604828	19.146854	18.870
348.13067741527794	-1.1937043288787734	20.052578	19.930082	20.231148	20.040188	20.167763	20.079391	20.054
348.2461021601764	1.1349593899913708	23.839916	21.971561	20.850773	20.38189	20.067202	19.695105	18.98
348.299611065616	-0.7605497687369258	19.809948	19.802359	19.835371	19.918865	19.92769	19.85315	19.875
348.46608265183744	-1.1752128153912331	21.339226	21.061277	20.88808	20.665922	20.841078	20.765362	20.176
348.7105150733019	1.390757174203209	19.806492	19.194584	19.160095	19.0041	18.832058	18.795828	18.493
348.8308033561476	-30.64921915522369	20.160553	20.074497	20.060188	20.039148	20.102238	20.140562	20.178
348.88240046675367	-30.813531857016685	16.66067	16.627388	16.621784	16.893513	16.765318	17.099766	17.061
349.2168428172675	0.8571987065141106	21.204388	20.137495	19.947876	20.031273	19.433554	19.217148	18.19
349.42752127421284	0.093129280239253	18.1126	17.882114	17.99154	17.987907	17.873886	18.031425	18.030
349.92814830462225	-30.44152729995124	20.259008	20.204285	20.027283	20.06831	19.073238	19.715614	19.81
350.1467244968801	-0.8808002402296434	19.008598	18.344675	18.541183	18.583664	18.442556	18.231152	17.555
350.1467502457788	-0.8807767191983554	19.0494	18.32715	18.486757	18.569292	18.591846	18.263735	17.49

350.3604588557264	-31.12485243647311	20.77681	20.7068	Bröckebrock D., 2018, <i>A&amp;A</i> , <b>618</b> , A78	and G. 20.526478	astrophysics	21.690722	as Ne	20159024	20.106
350.88051361237183	1.134997376685103	20.075825	18.975634	Active Galaxies. 17, 1951–00	17, 1951–00	Nuclei. 17, 1951–00	17, 1951–00	University	1741150	Books, 18.6545
351.0847562454346	-0.1069557818481737	19.02745	18.2680	/books/890260105.com.b181635977d=Hgfr18DjB798C	18.823398	18.823398	18.823398	18.823398	18.326977	17.227
351.08902800249376	-0.1081688053941925	18.866434	18.519917	Barker Q. A., Boissé J. S., Frey D., 2016, in: Journal of Physics Conference Series, <b>182</b> , 032008 ( <a href="#">arXiv:1603.07042</a> ) doi: <a href="#">10.1088/1742-6596/728/3/032008</a>	18.823398	18.823398	18.823398	18.823398	18.823398	17.875
351.2406451424701	0.3648363114586009	19.963604	19.2077	19.036219	19.036219	19.036219	19.036219	20.063948	19.844282	19.901
351.3517724774783	0.7700617331859075	20.229946	19.864758	Pickles A. J., 1998, <i>PASP</i> , <b>110</b> , 863	19.74516	19.515806	19.628952	19.597795	19.419	19.419
351.46448670155314	-1.6732732825345382	18.831156	18.67714	Ratti E. M., Steeghs D. T. H., Jonker P. G., Torres M. A. P., Bassa C. G., 2011003 ( <a href="#">arXiv:1103.07042</a> ) doi: <a href="#">10.1088/0035-8712-12-1-003</a>	18.70857	19.217567	19.38831	19.34738	19.775	19.775
351.4812848799453	-0.619649969309404	22.239634	21.011003	Verbunt F., 20.601254 ( <a href="#">MNRAS</a> , <b>420</b> , 93)	21.560307	21.049892	21.156387	20.826	20.826	20.826
351.9320769678968	-2.0154836384737007	19.489239	18.81394	dabhi L., Zijlstra A. A., Wareing C., Corradi R. L. M., Mampaso A., Viironen J., Wright M. J. Parker Q., 18.861649 ( <a href="#">Publ. Astron. Soc. Australia</a> , <b>31</b> , 342)	18.950624	19.139263	19.4426	18.573874	17.184	17.184
351.9349111408217	-2.0130122785984863	19.06237	18.370360	18.370360	18.886053	18.986053	18.986053	18.013342	16.446	16.446
352.05124626986577	-1.0624481917322088	19.610971	19.902771	19.902771 ( <a href="#">MNRAS</a> , <b>166</b> , 19.297226)	20.089163	20.196	20.196	20.05997	19.478	19.478
352.25183229093045	-29.77943600230389	15.014418	15.013781	gi S., Gruber K., Verbeek K., 15.014418 ( <a href="#">MNRAS</a> , <b>491</b> , 1699)	15.014418	15.014418	15.014418	15.014418	15.014418	15.61
352.768315319454	-0.7102948577467144	23.710735	21.90304	( <a href="#">MNRAS</a> , <b>380</b> , 639)	21.16668	20.541828	20.520813	20.435	20.435	20.435
352.99905235631786	-0.8051318589747921	19.06745	18.259048	Schwope A. D., Catanion M. S., Beutermann K., 18.031693 ( <a href="#">A&amp;A</a> , <b>510</b> , 4496)	18.20008	18.031693	18.031693	18.031693	18.031693	17.707
353.22826977772627	-30.978836100206514	21.35175	21.317837	Steeghs D., 20.485315 ( <a href="#">MNRAS</a> , <b>313</b> , 533)	21.481695	22.15894	20.819191	20.477	20.477	20.477
353.2361807443991	1.1897411683153614	23.023031	23.94062	Steeghs D., Casares J., 2002, <i>ApJ</i> , <b>568</b> , 273	22.99015	22.988016	22.004036	22.083	22.083	22.083
353.25093145251367	-0.3418033383059611	21.520702	21.15973	Vink J. S., Drew J. E., Steeghs D., Wright N. J., Martin E. L., Gänischke B., 21.520702 ( <a href="#">MNRAS</a> , <b>394</b> , 15)	20.648195	20.267132	19.85534	19.574	19.574	19.574
353.660612982189	0.3949855898346673	19.342155	18.931799	Greimel R., Drakos, 2008, <i>MNRAS</i> , <b>387</b> , 308	19.394649	19.686016	19.523329	19.494	19.494	19.494
353.8374272193407	1.1742822684735112	20.46233	20.167088	Wevers T., et al., 20.18509 ( <a href="#">MNRAS</a> , <b>460</b> , 983)	19.766695	19.484089	19.019012	18.613	18.613	18.613
353.8445277828368	-0.1097797881436761	20.044003	19.849027	Ham A. R., 19.85772006, ( <a href="#">MNRAS</a> , <b>403</b> , 1406, 581)	20.084095	20.109789	19.879	19.879	19.879	19.879
354.19570227897805	0.6232818326354911	20.967358	20.3W20	Ham A. R., 20.17942607, ( <a href="#">MNRAS</a> , <b>799</b> , 1158)	20.158413	20.00432	19.789	19.789	19.789	19.789
354.3417350883094	0.3775467635964666	20.234406	20.11W001	Ham A. R., 20.17942607, ( <a href="#">MNRAS</a> , <b>799</b> , 1158)	20.025082	20.067782	19.900	19.900	19.900	19.900
354.38244578497734	0.4333010734691366	20.401451	20.3096	B. T., Gruber K., Mampaso A., 20.2008, ( <a href="#">MNRAS</a> , <b>46</b> , 20591277)	20.2008	19.991003	19.829	19.829	19.829	19.829
354.4482155147033	0.295228446902126	23.628456	23.039029	Spaandonk K. & Steeghs D., 23.039029 ( <a href="#">MNRAS</a> , <b>389</b> , 1512)	22.977435	22.426552	22.53247	22.177	22.177	22.177
355.16011198023494	-0.8918305906086714	19.769873	19.838434	Drew J. E., Steeghs D., Marsh T. R., Torres M. A. P., 2010, ( <a href="#">MNRAS</a> , <b>401</b> , 1857)	19.414825	19.367321	19.291416	19.325056	18.791	18.791
355.8714951658231	-30.03336765255501	19.733658	19.582882	19.419632	19.49099	19.442318	19.642885	19.617	19.617	19.617
356.1688766402904	-0.2016823731104521	20.449211	20.125475	19.992908	20.344463	20.758574	20.601063	20.428	20.428	20.428
357.0999479884554	-1.7919613357037034	20.697786	20.14APPENDIX A IS SOME EXTRA MATERIAL	Greimel R., 2011, ( <a href="#">A&amp;A</a> , <b>527</b> , 15275)	20.14APPENDIX A IS SOME EXTRA MATERIAL	19.87931	19.610	19.610	19.610	19.610
357.50647665269133	-30.18530531379982	20.42384	20.003433	19.685694	20.006023	20.064669	19.803032	19.803032	19.803032	19.803032
357.8152522370048	-1.0744996159314814e-05	21.96098	21.145262	21.040382	21.661257	20.877253	20.589285	20.589285	20.589285	20.589285
357.8153294830434	-5.8998646198314144e-05	21.329817	This paper has been typeset from a TeX file prepared by the author	21.05145	21.044982	20.444982	20.875408	20.875408	20.875408	20.875408
358.9422665997112	-0.3952102105534735	99.0	24.108534	20.530624	20.210457	20.091396	19.667824	19.667824	19.667824	19.667824
359.32653511559846	0.7307049350125405	22.923082	23.192045	22.773634	23.094099	99.0	21.67802	21.67802	21.67802	21.67802
359.5218549462989	-1.3649719892078715	21.351126	20.866419	20.921608	20.829044	21.818121	20.397083	20.397083	20.397083	20.397083

## 5 CONCLUSIONS

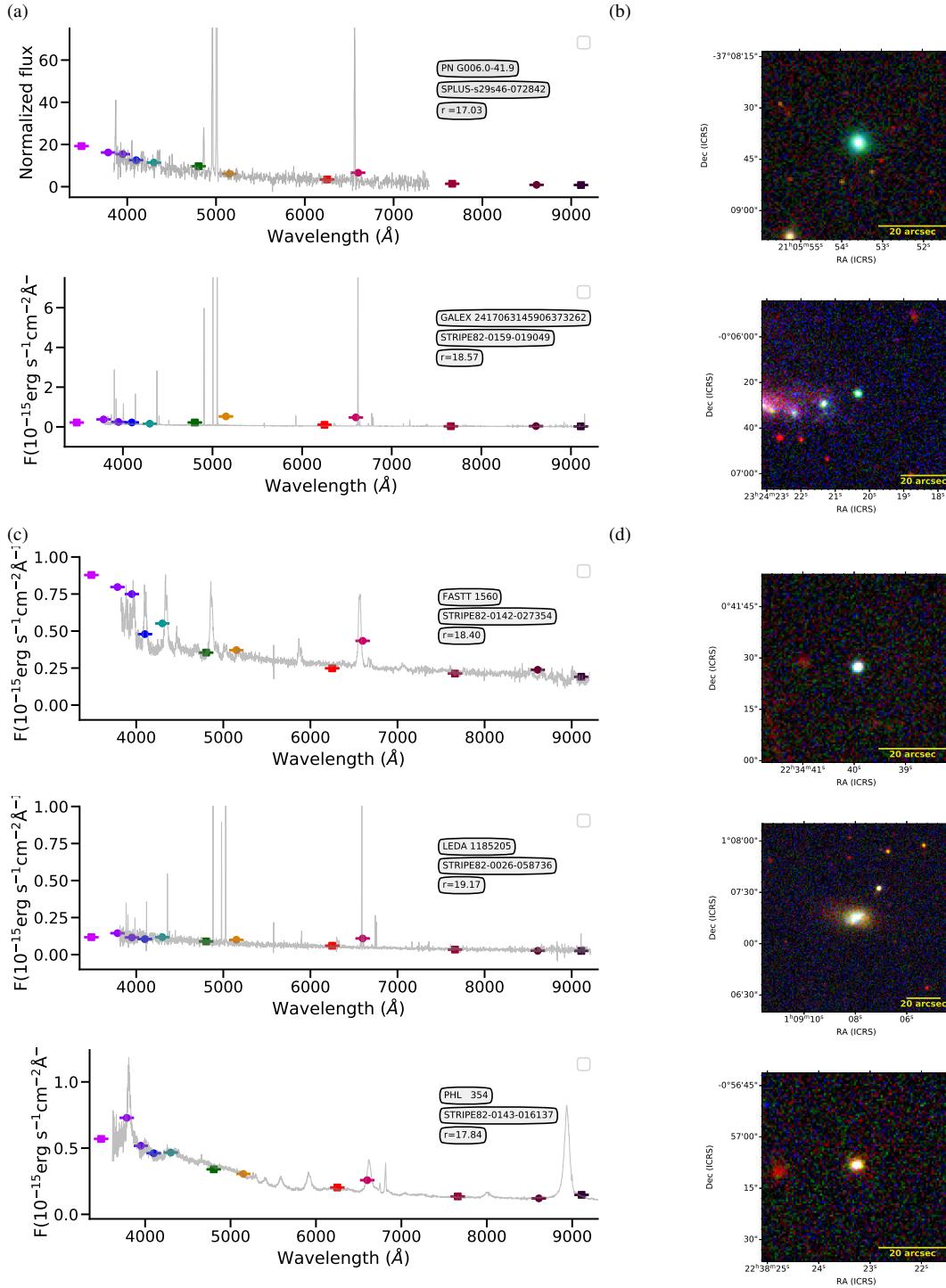
We have found a important sample of emission line objects.

## ACKNOWLEDGEMENTS

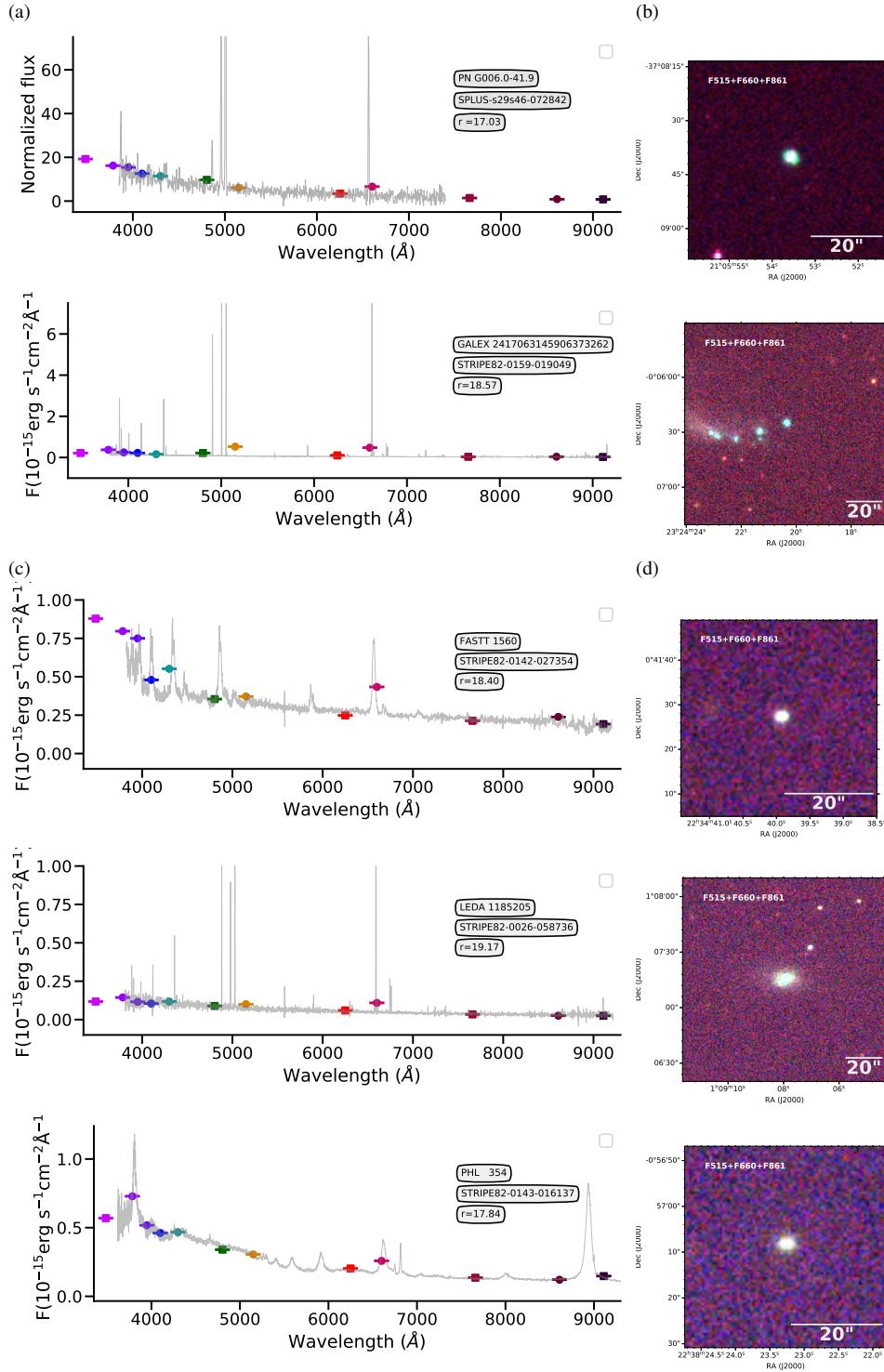
### DATA AVAILABILITY

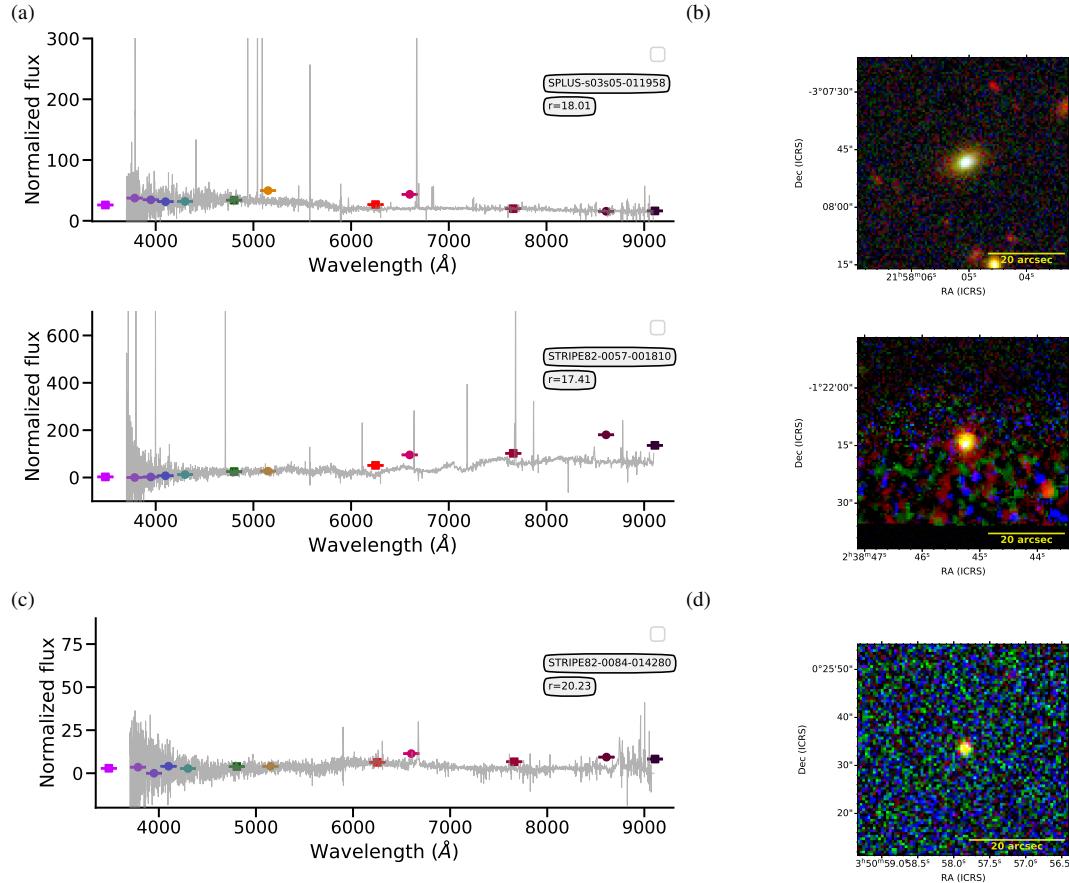
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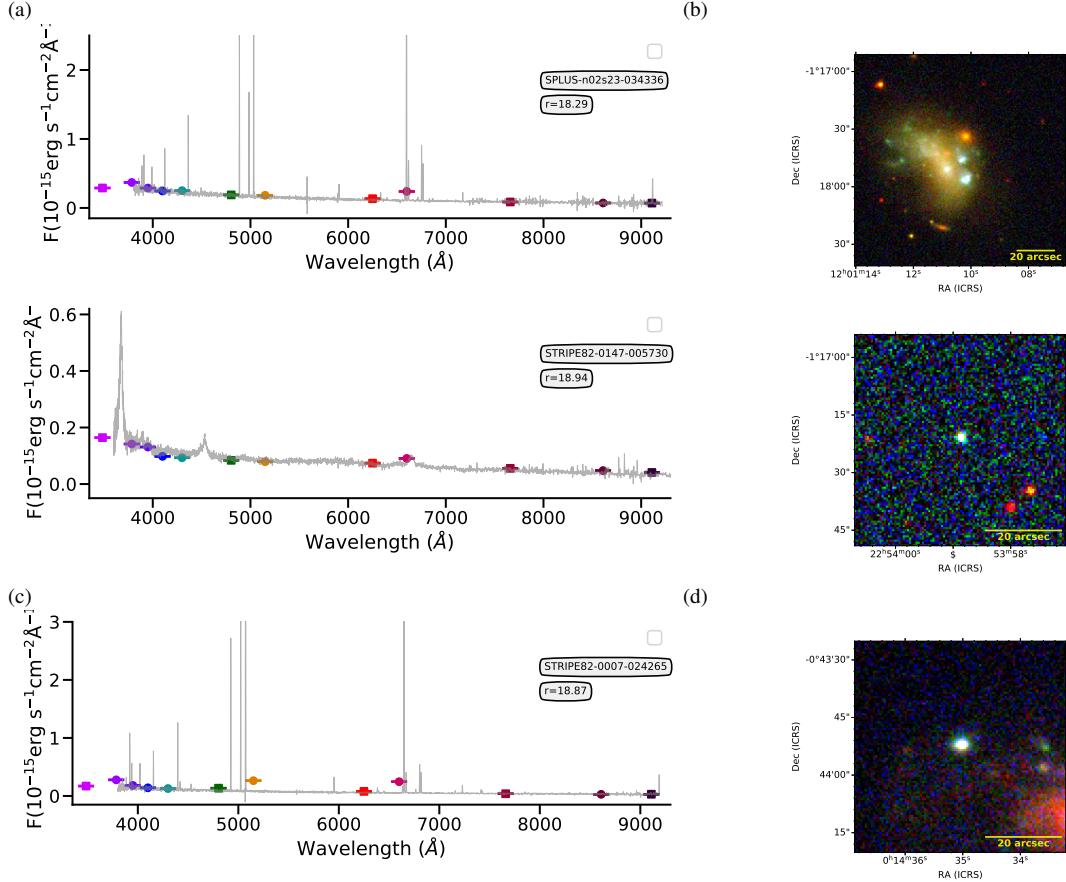


**Figure 11.** Spectra of the known objects select with our algorithm

**Figure 12.** Spectra of the known objects select with our algorithm



**Figure 13.** Spectra of the Lamost

**Figure 14.** Spectra of the SDSS