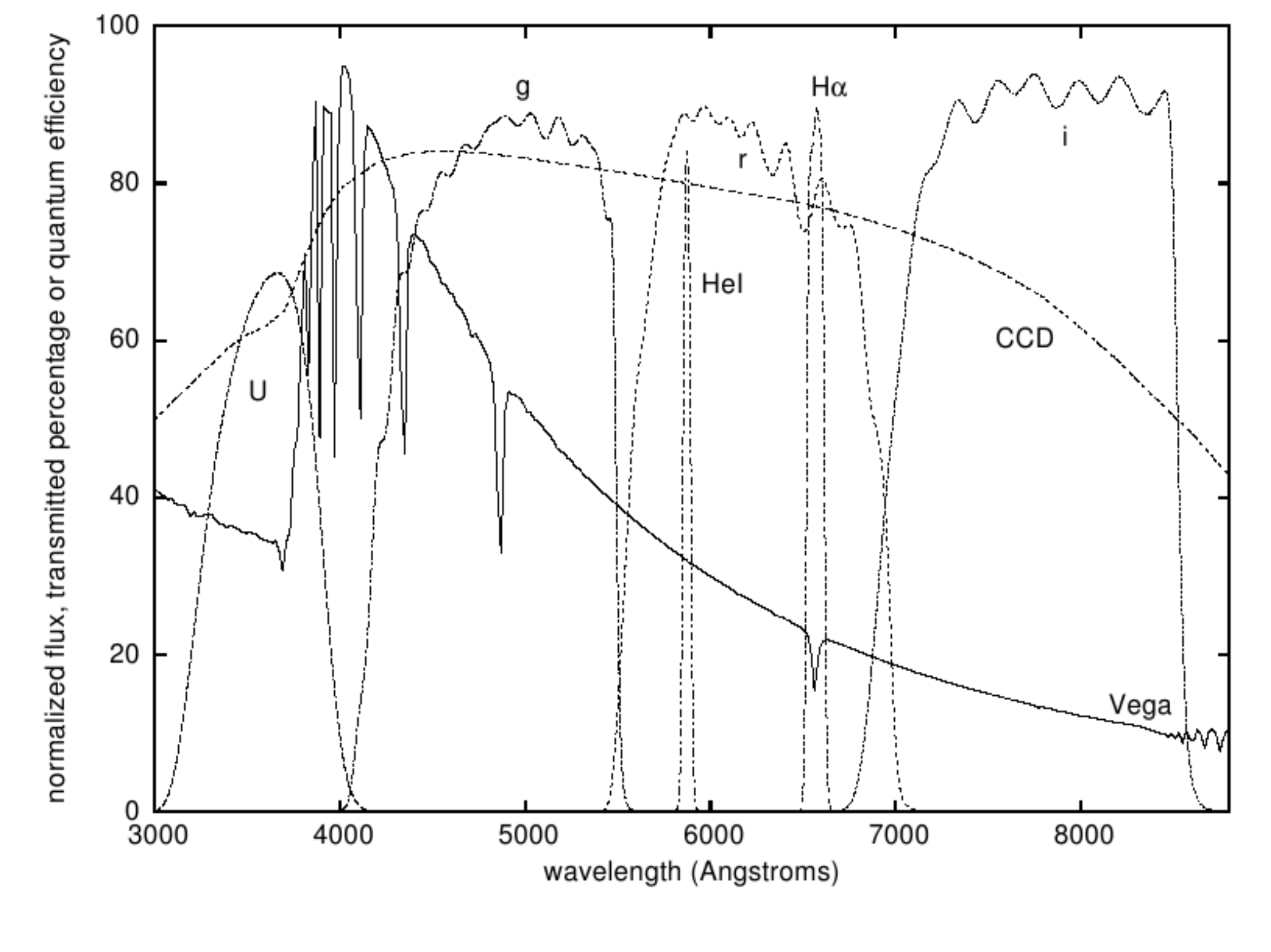
A first catalogue of automatically selected UV-excess sources from the UVEX survey

Optical and Infrared Galactic Plane Survey meeting, 21 July 2011, U of H

Kars Verbeek, Paul Groot and Eelco de Groot
Radboud University Nijmegen

Tunc Tezel


normalized flux, transmitted percentage or quantum efficiency
wavelength (Angstroms)
100
80
60
40
20
0
3000
4000
5000
6000
7000
8000
g
Hα
r
i
HeI
U
CCD
Vega

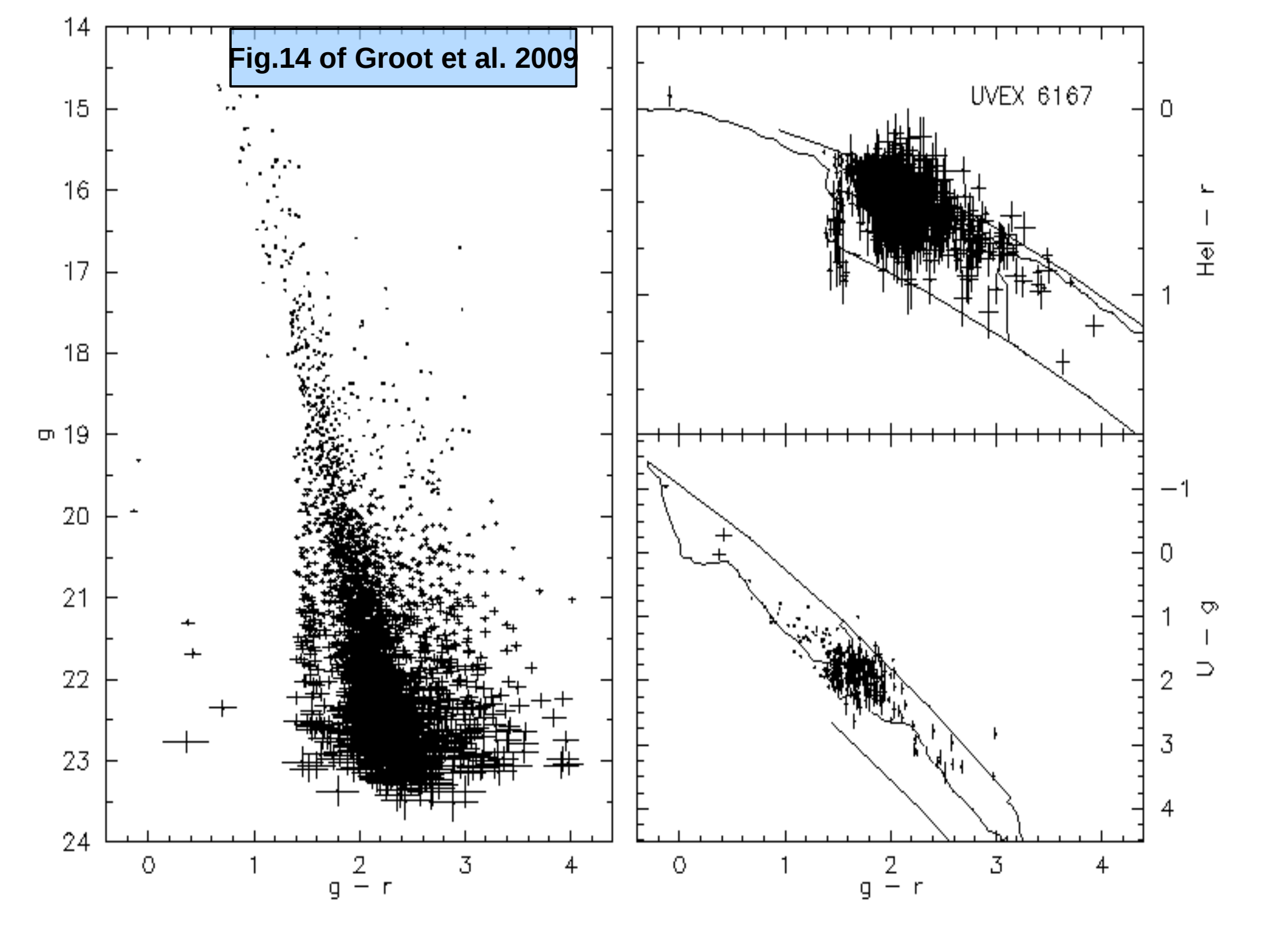
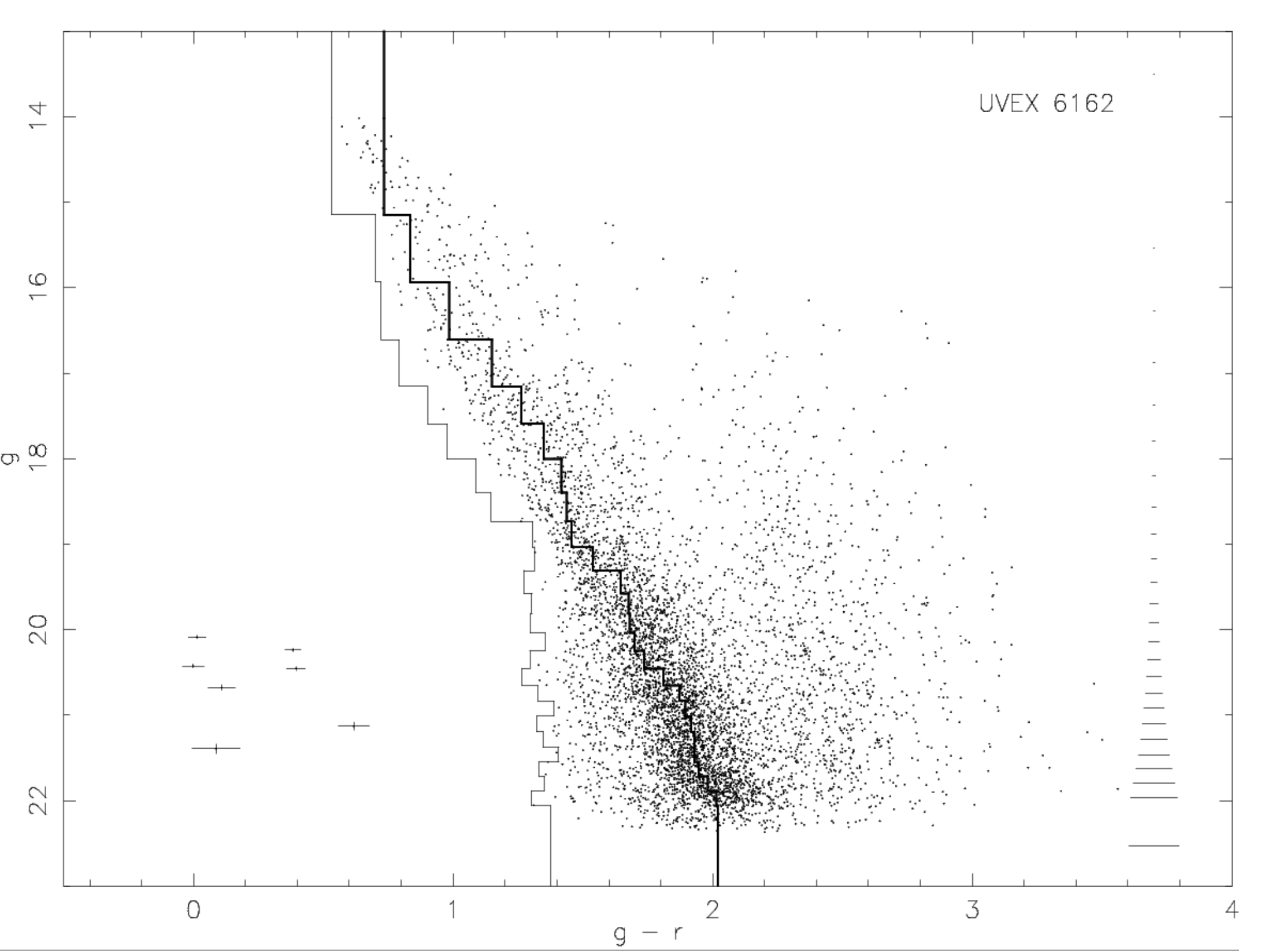
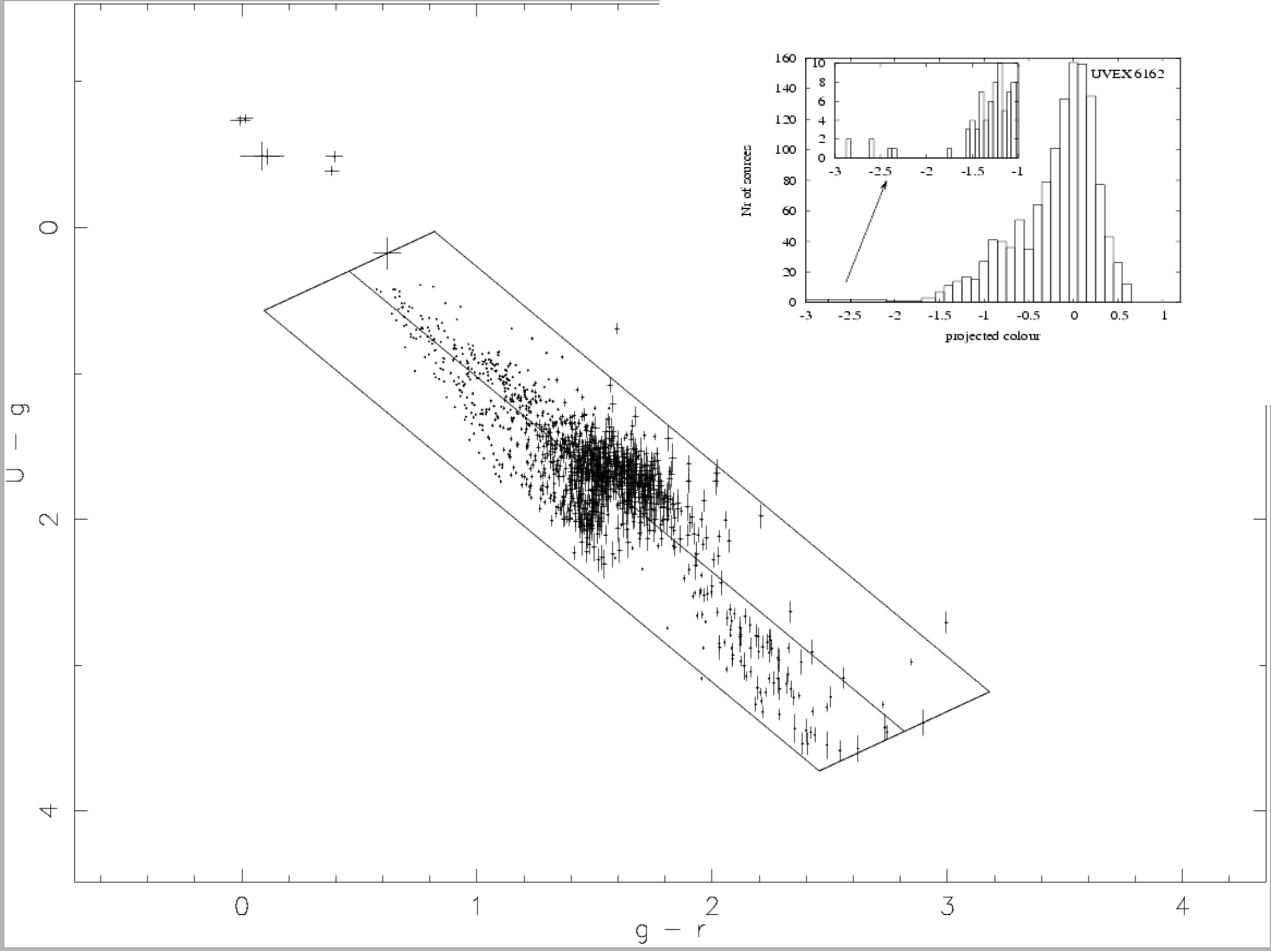
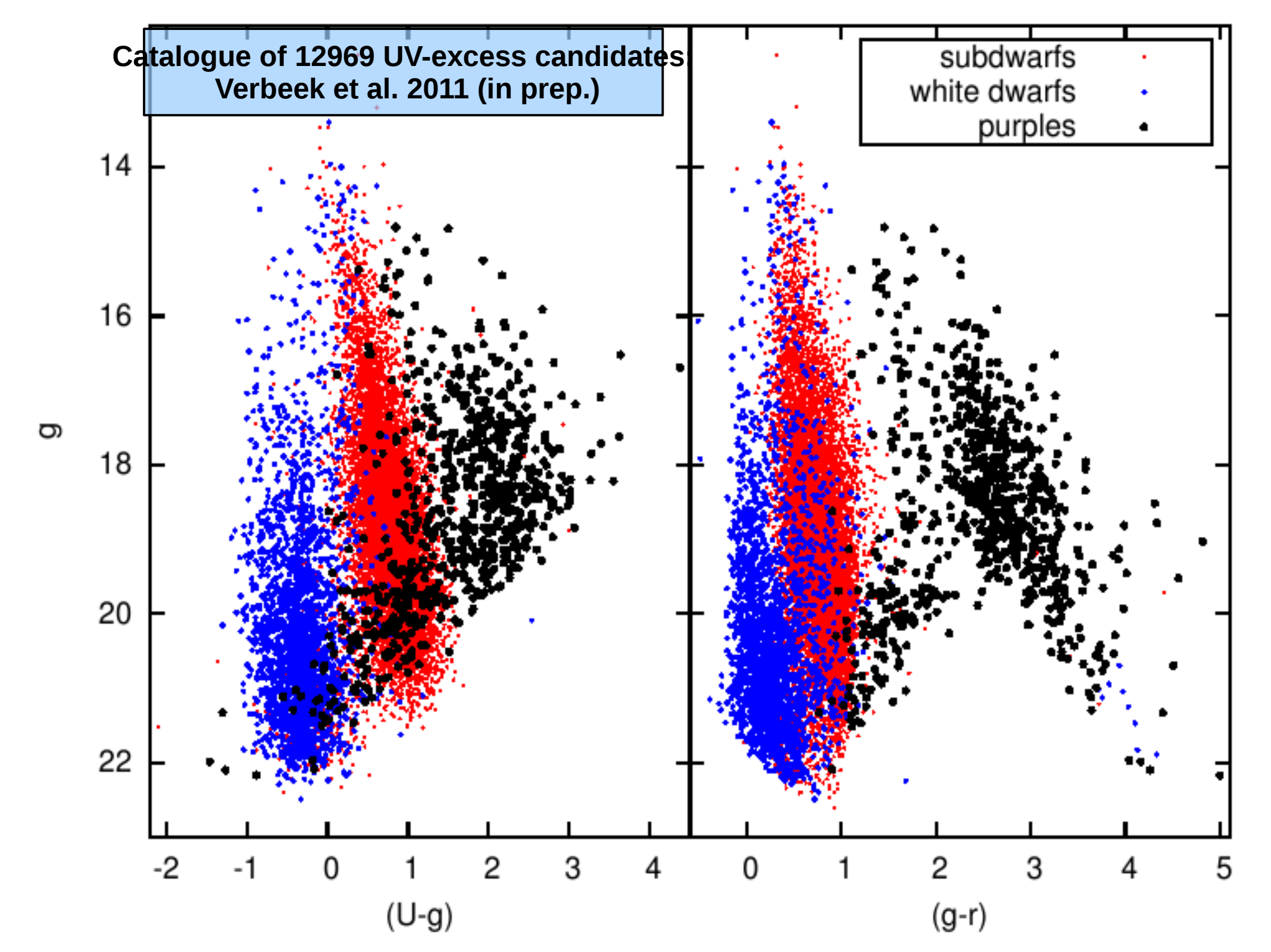
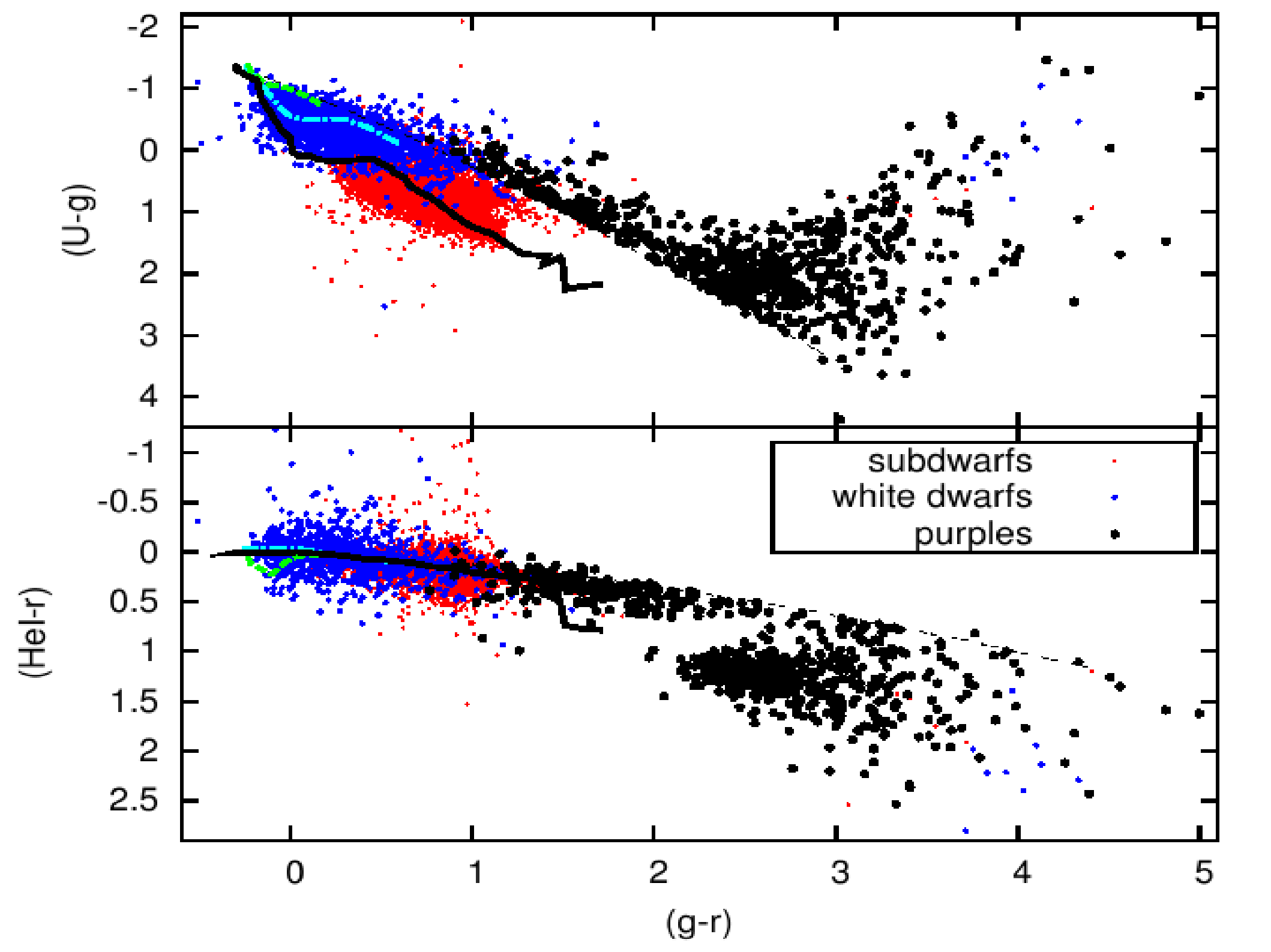


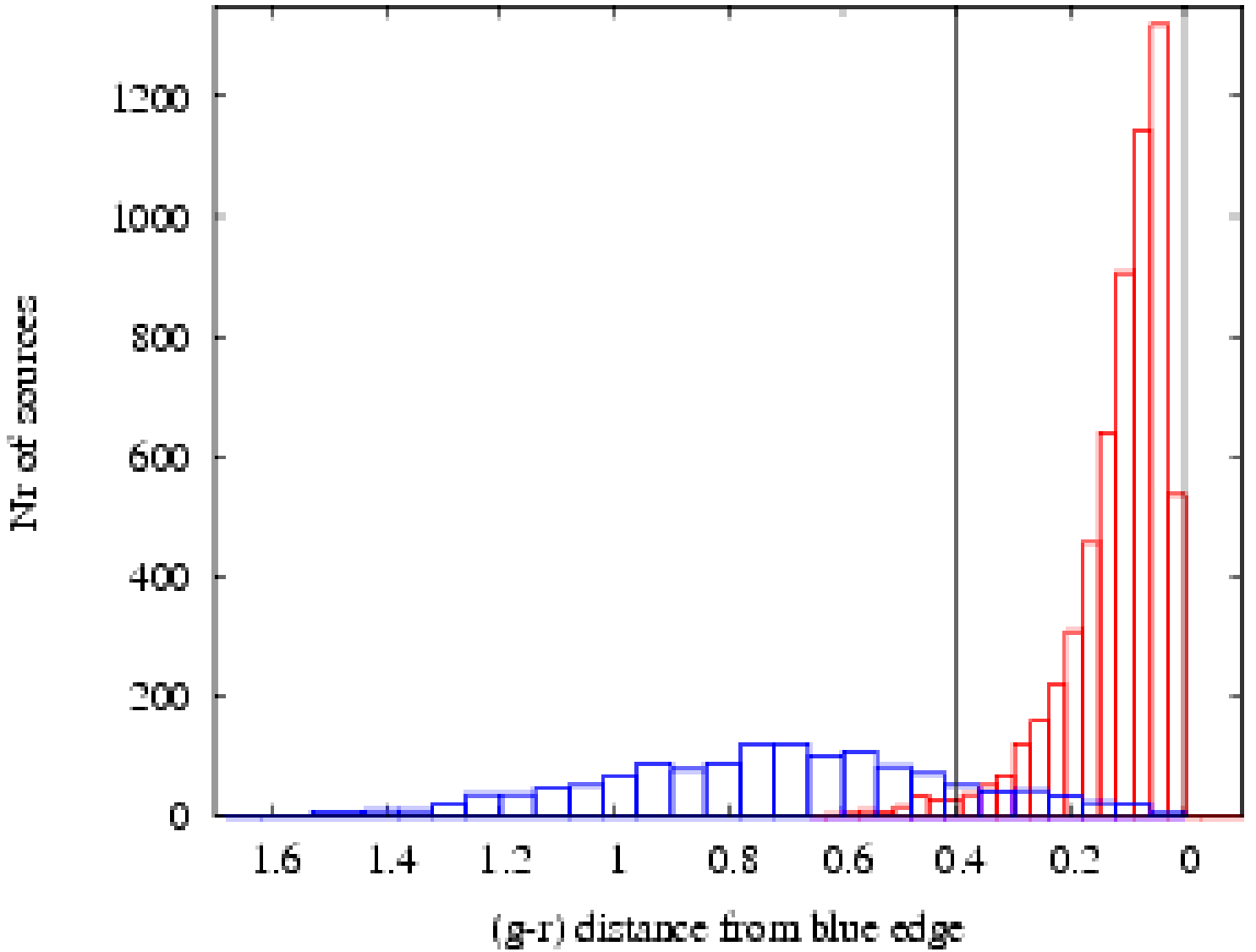
Fig.14 of Groot et al. 2009
UVEX 6167
g
g − r
Hel − r
U − g


UVEX 6162
g
14
16
18
20
22
0
1
2
3
4
g − r


U − g
g − r
0
2
4
0
1
2
3
4
UVEX6162
Nr of sources
projected colour
160
140
120
100
80
60
40
20
0
10
8
6
4
2
0
-3
-2.5
-2
-1.5
-1
-0.5
0
0.5
1


Catalogue of 12969 UV-excess candidates
Verbeek et al. 2011 (in prep.)
subdwarfs
white dwarfs
purples
g
14
16
18
20
22
-2
-1
0
1
2
3
4
(U-g)
0
1
2
3
4
5
(g-r)


-2
-1
0
1
2
3
4
(U-g)
-1
-0.5
0
0.5
1
1.5
2
2.5
(Hel-r)
0
1
2
3
4
5
(g-r)
subdwarfs
white dwarfs
purples

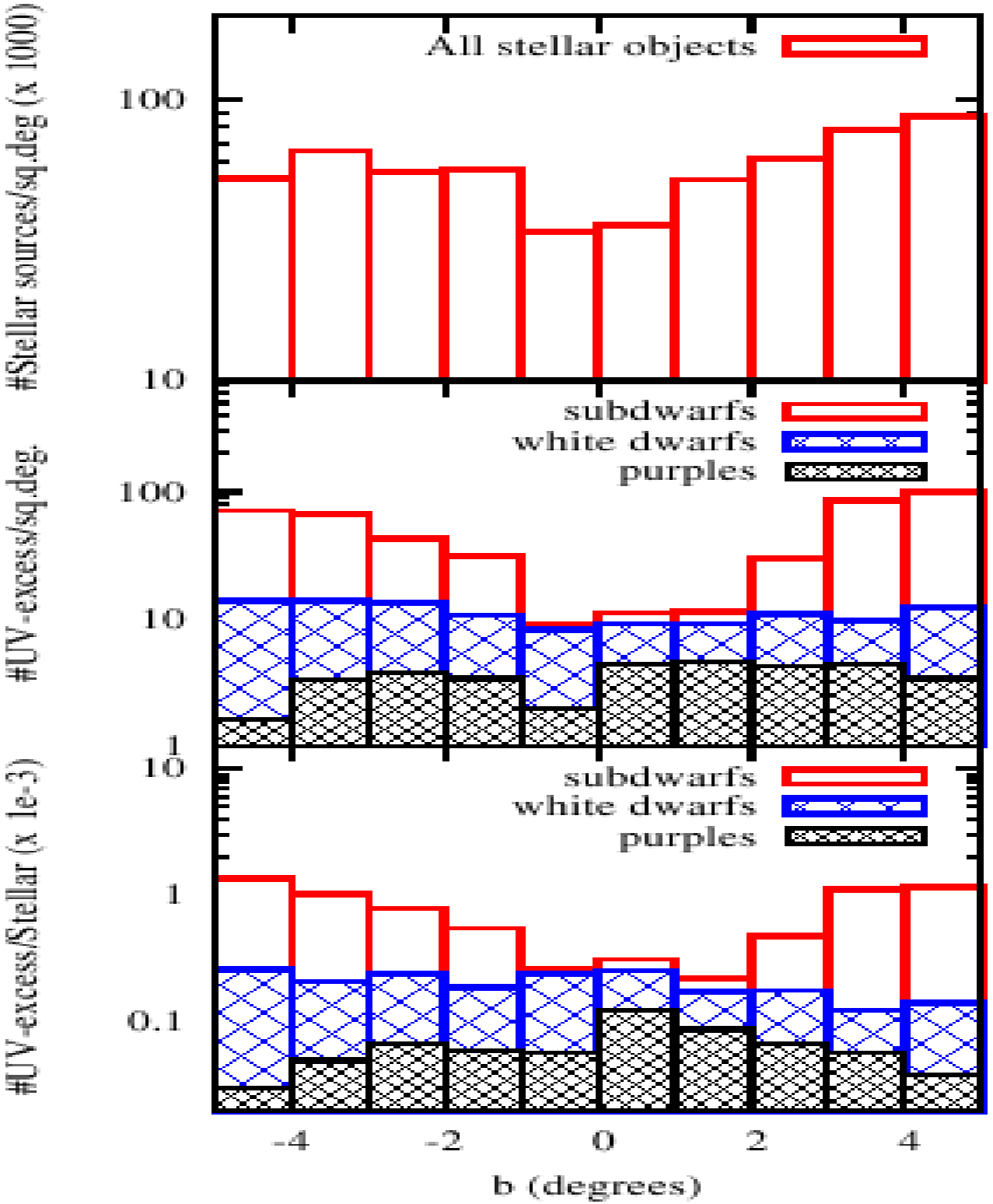

1200
1000
800
600
400
200
0
Nr of sources
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
(g-r) distance from blue edge

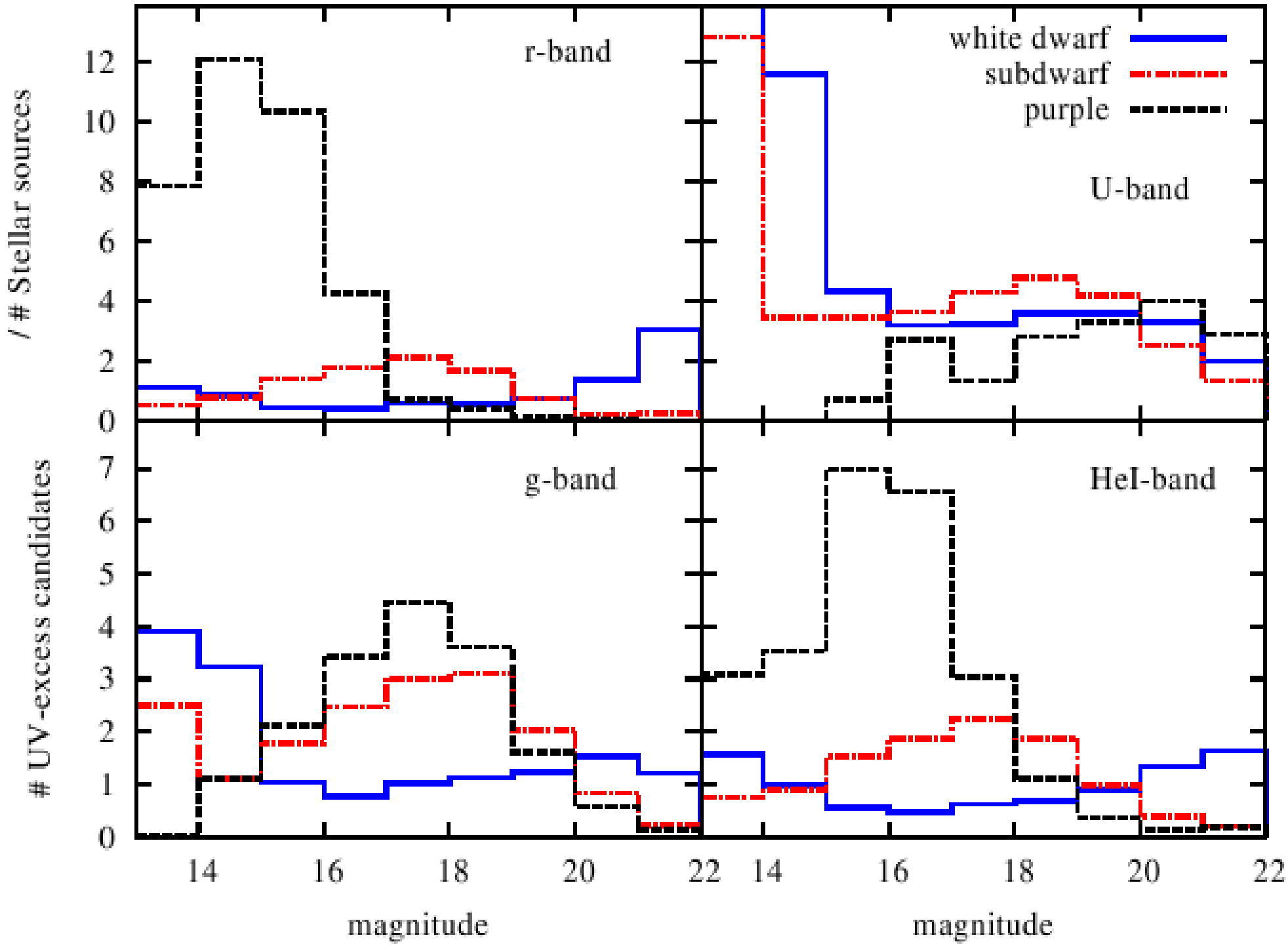
How are the sources in the “white dwarf” sample selected?

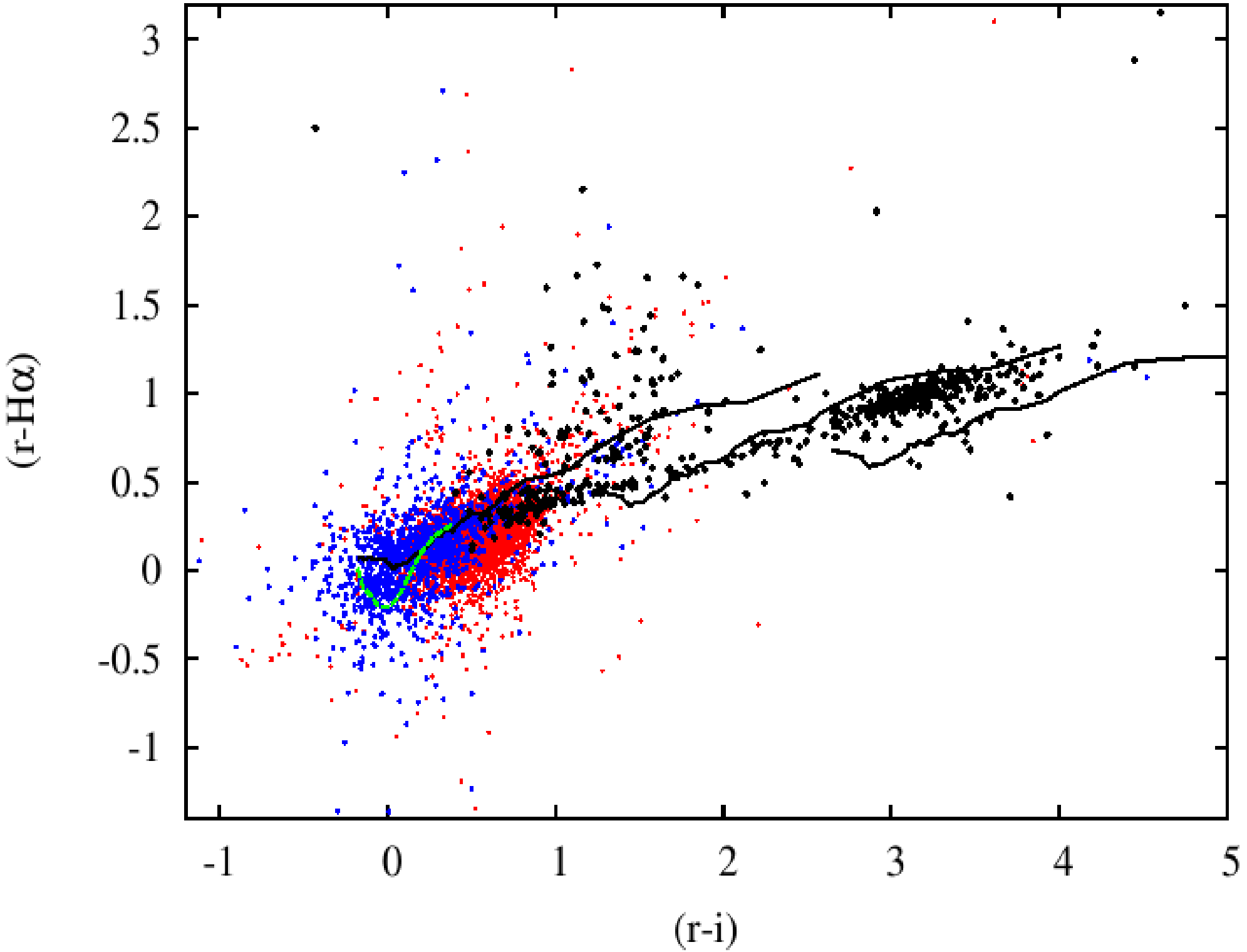
> 96% is selected in (g-r) vs. g
> 67% is selected in (U-g) vs. g
> 76% is selected in (g-r) vs. g more than 0.4mag from the blue edge
> 60% is selected in (U-g) vs. g more than 0.4mag from the blue edge
> 63% is selected in (U-g) vs. (g-r)
> 6% is selected in (g-r) vs. g but not in (U-g) vs. g
> 2% is selected in (U-g) vs. g but not in (g-r) vs. g
> No sources are selected in (U-g) vs. (g-r) but not in a CMD.

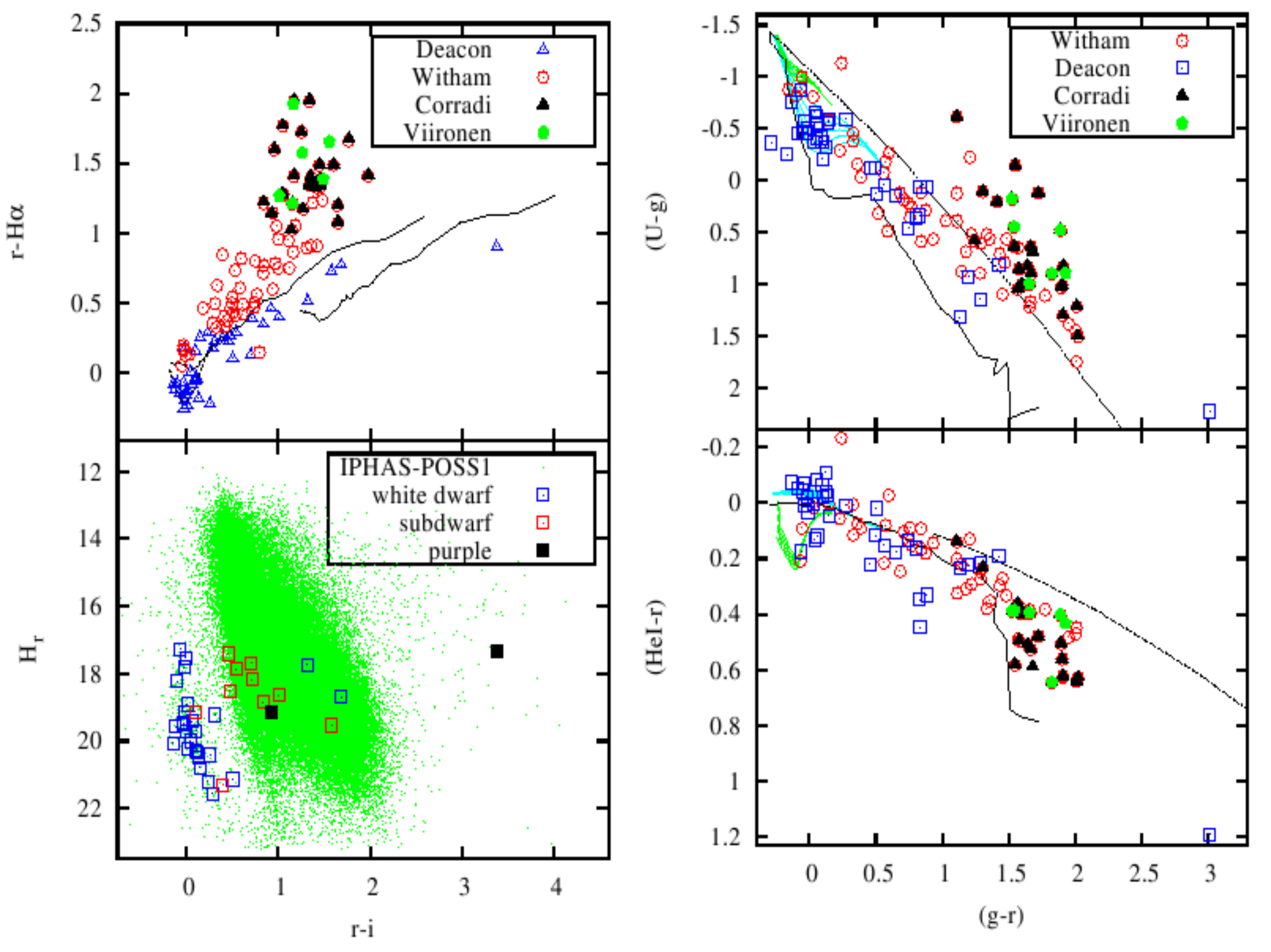
Table 2. Number of white dwarfs/subdwarfs/purples (w/s/p) in the UV-excess catalogue.

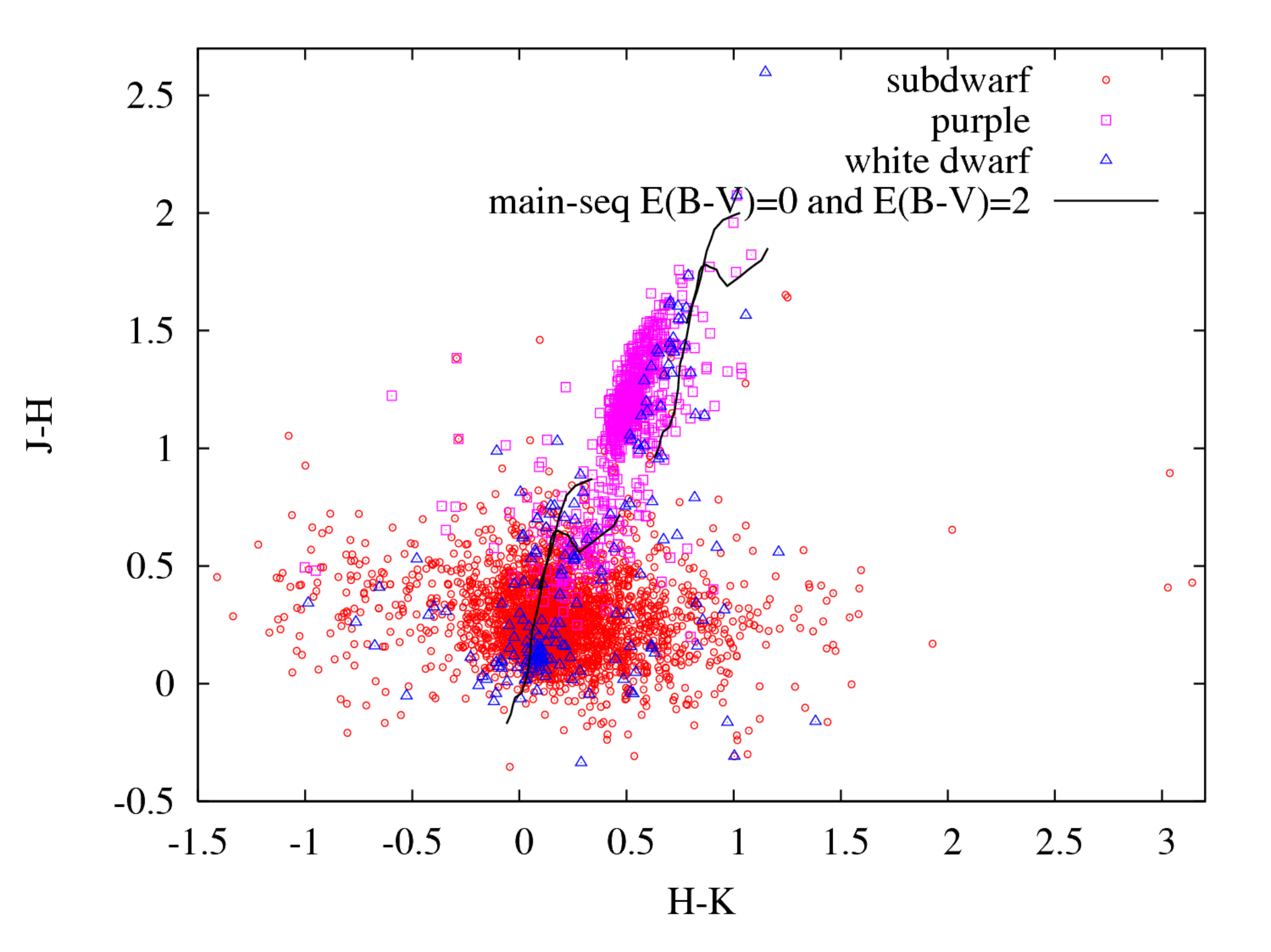
UV-excess sources:	Nr and fraction (%) of w/s/p:
in final catalogue	2 366/9 896/749 (100/100/100)
with U-band	2 279/9 091/749 (88.9/86.1/100)
with HeI-band	1 239/7 755/706 (48.3/73.4/94.3)
with U and HeI-band	1 233/7 373/706 (48.1/69.8/94.3)

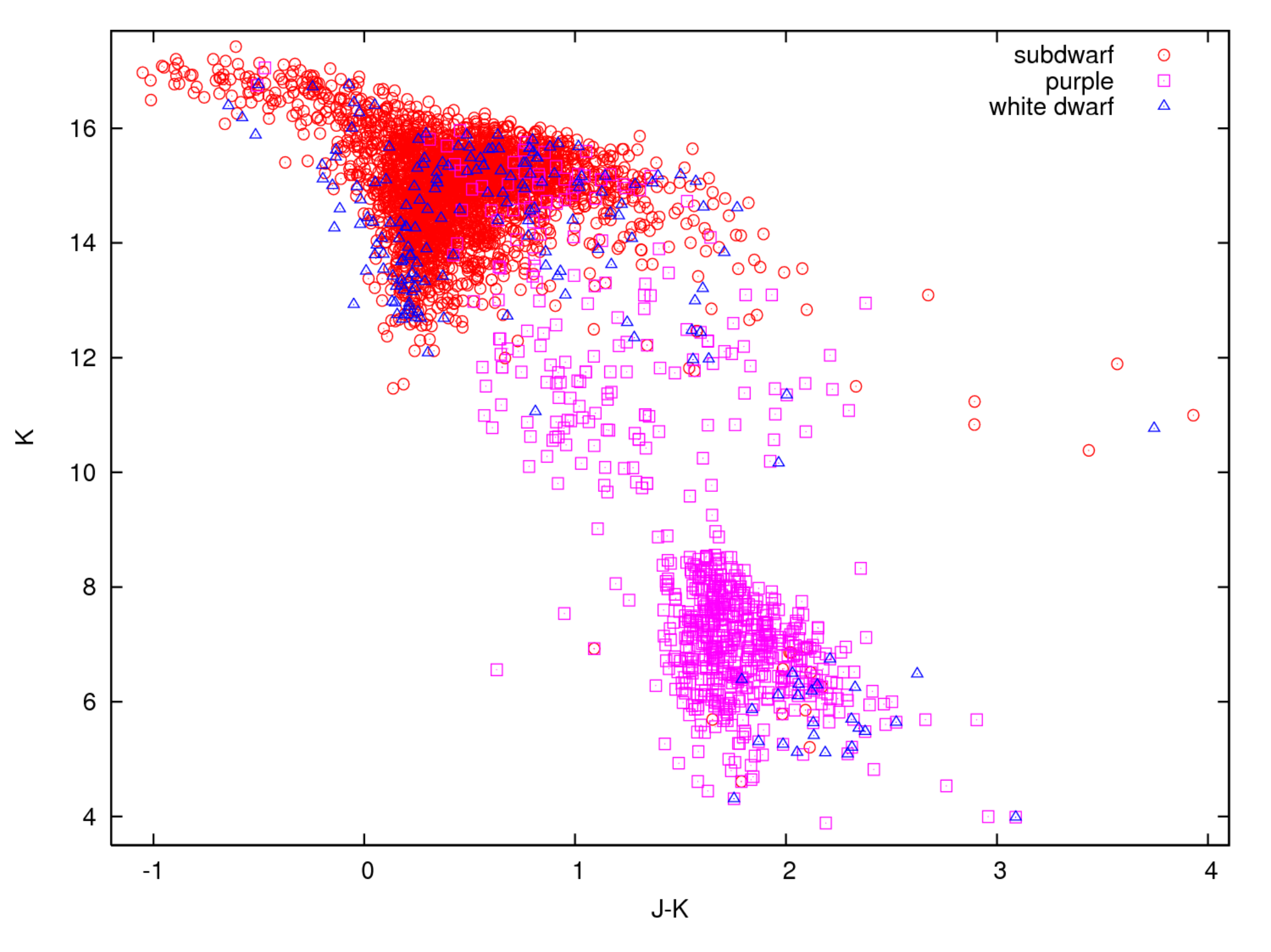

All stellar objects
100
10
#Stellar sources/sq.deg (x 1000)
subdwarfs
white dwarfs
purples
100
10
1
#UV-excess/sq.deg.
subdwarfs
white dwarfs
purples
10
1
0.1
#UV-excess/Stellar (x 1e-3)
-4
-2
0
2
4
b (degrees)


r-band
U-band
g-band
HeI-band
white dwarf
subdwarf
purple
/ # Stellar sources
UV-excess candidates
magnitude
magnitude
0
2
4
6
8
10
12
1
3
5
7
14
16
18
20
22


3
2.5
2
1.5
1
0.5
0
-0.5
-1
(r-Hα)
-1
0
1
2
3
4
5
(r-i)


Deacon
Witham
Corradi
Viironen
r-Hα
IPHAS-POSS1
white dwarf
subdwarf
purple
H_r
r-i
Witham
Deacon
Corradi
Viironen
(U-g)
(HeI-r)
(g-r)

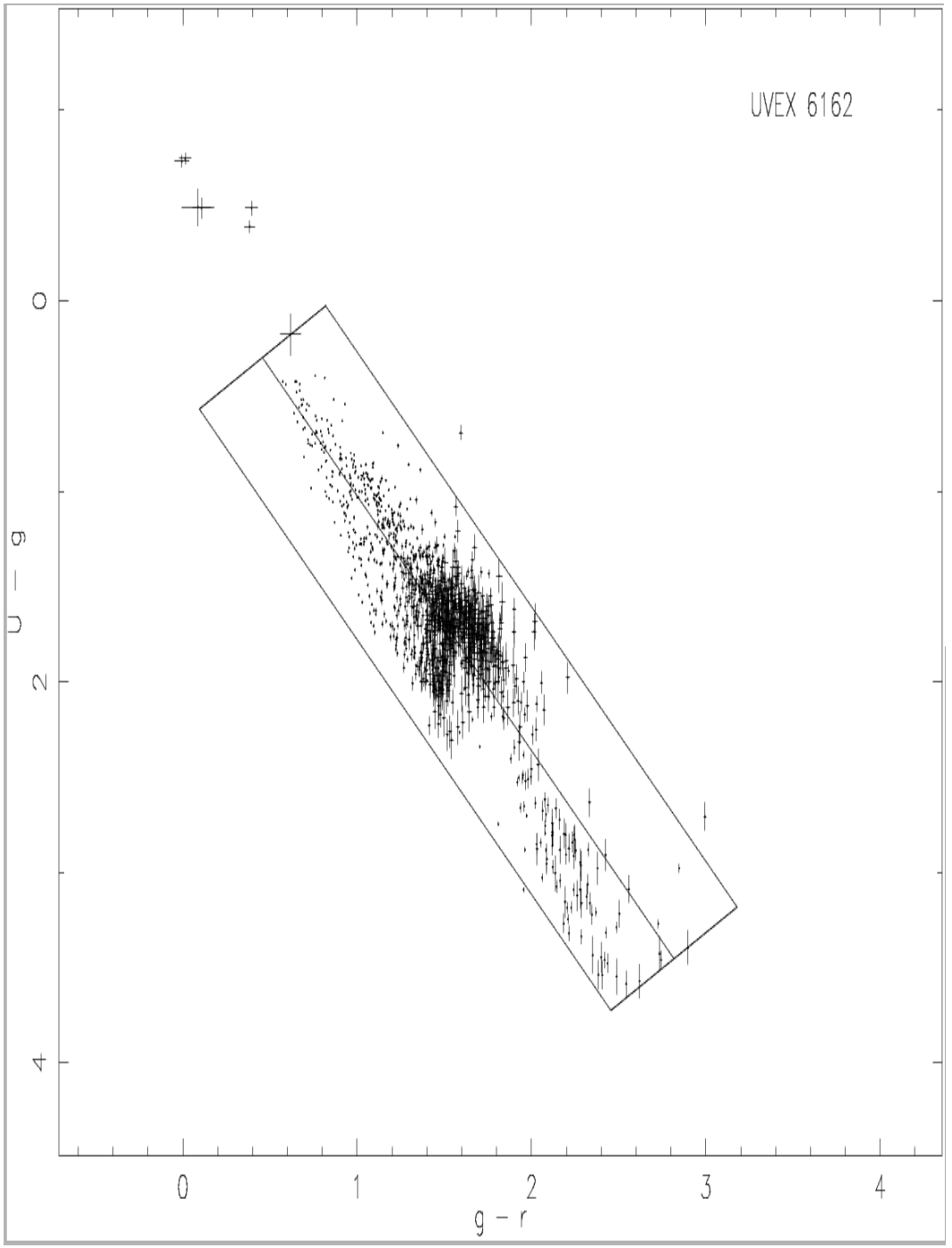

subdwarf
purple
white dwarf
main-seq E(B-V)=0 and E(B-V)=2
J-H
H-K
2.5
2
1.5
1
0.5
0
-0.5
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
3

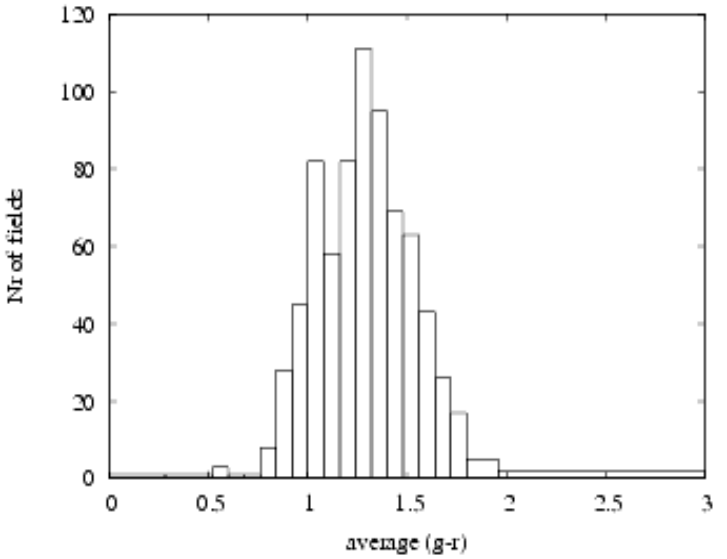

subdwarf
purple
white dwarf
K
J-K
16
14
12
10
8
6
4
-1
0
1
2
3
4

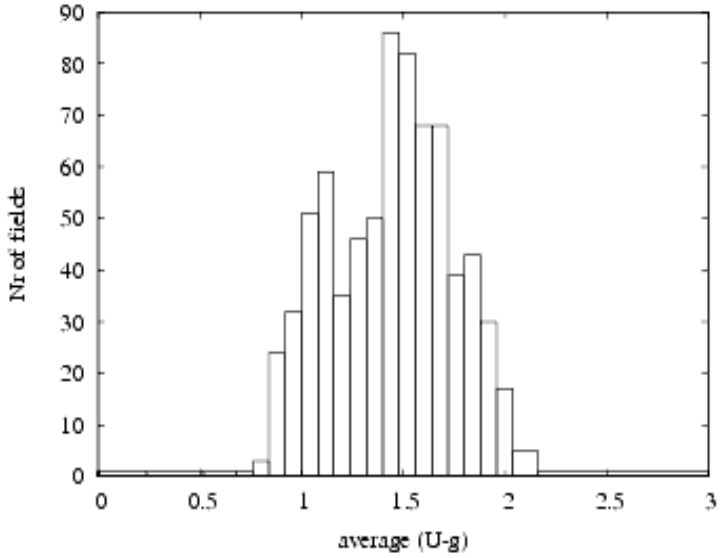
Cross-matching of UV-excess catalogue with 3 sub-samples: 2366 “white dwarfs”, 9896 “subdwarfs” and 749 “purples”:

Table 3. Summary of the UV-excess cross-matching.

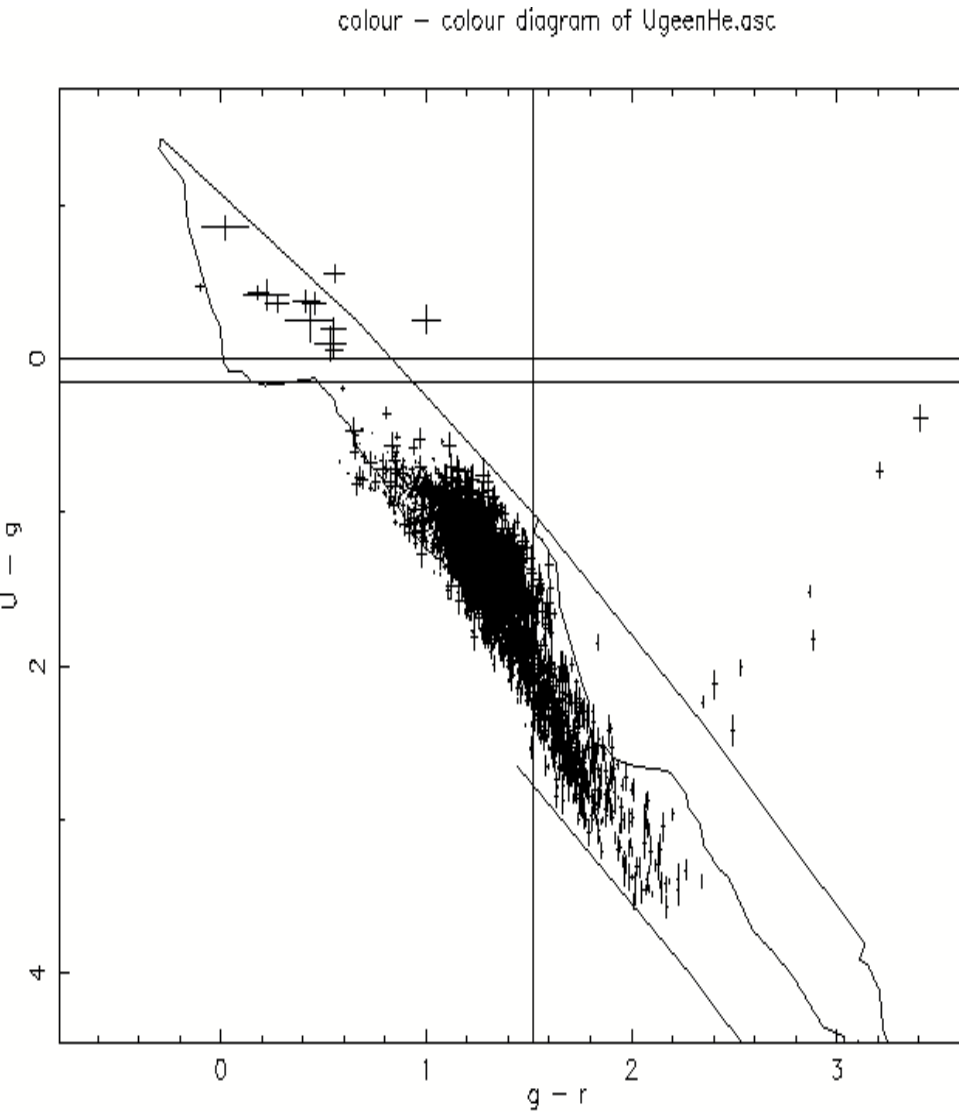
Catalogue:	Nr and fraction (%) of w/s/p:
Simbad	32/34/79 (1.35/0.34/10.55)
2MASS	210/3 661/685 (9/37/91)
IPHAS IDR	1 239/8 248/513 (52/83/68)
Deacon IPHAS-POSSI	24/9/2 (1.01/0.09/0.27)
Witham Hα	20/26/27 (0.85/0.26/3.60)
Corradi Symbiotics	6/6/17 (0.25/0.06/2.27)
Viironen PNs	1/2/4 (0.04/0.02/0.53)

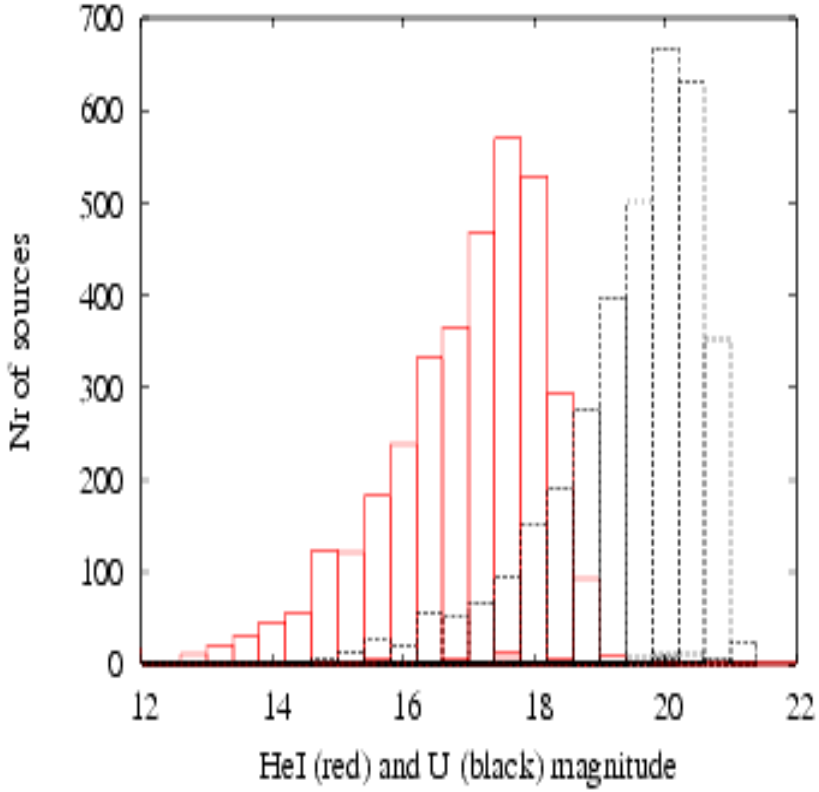

UVEX 6162
U − g
g − r
0
2
4
0
1
2
3
4


Nr of fields
average (g-r)
0
20
40
60
80
100
120
0
0.5
1
1.5
2
2.5
3


Nr of fields
average (U-g)
0
10
20
30
40
50
60
70
80
90
0
0.5
1
1.5
2
2.5
3

While the HeI-band in UVEX goes deeper than the U-band:
600.000 stellar sources have a U-band detection but no HeI detection...





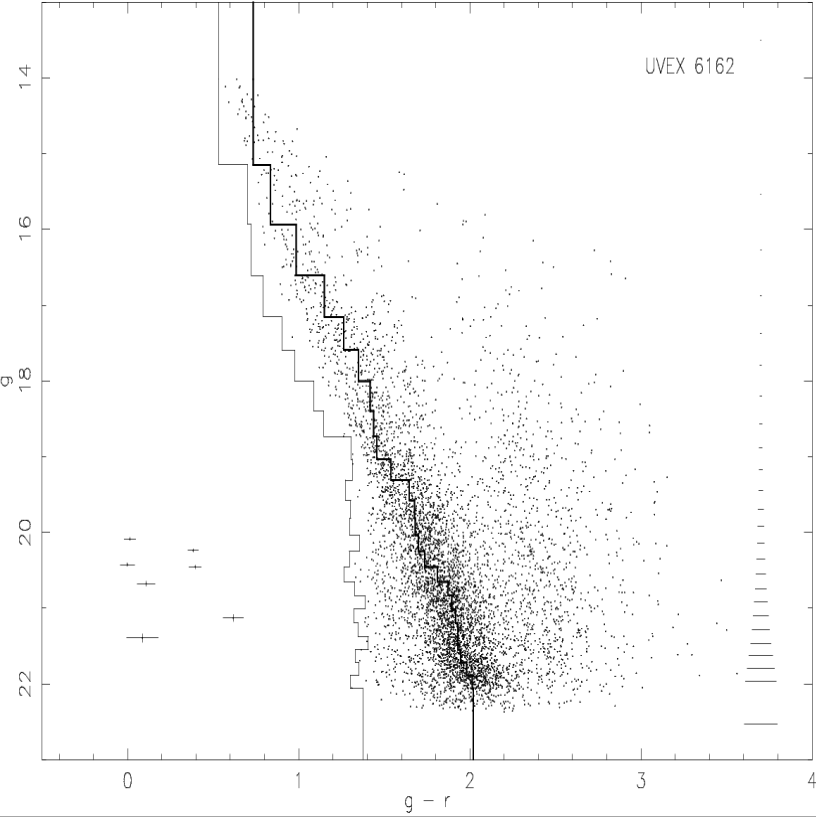
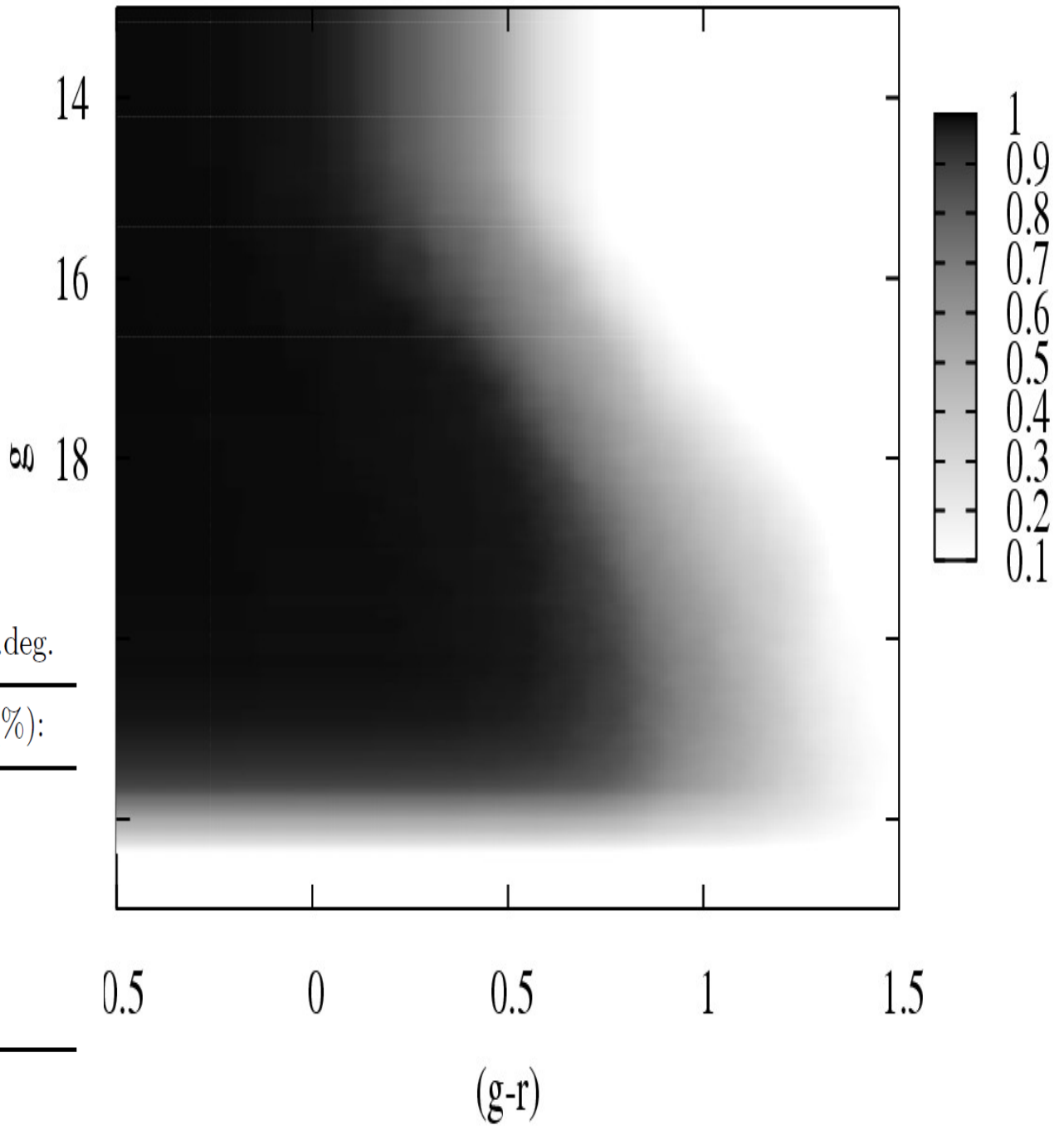


Table 1. All (probably) stellar sources from 220 sq.deg.

Objects detected:	Number:	Fraction (%):
in the g and r-band	7 451 792	100
in the U-band	1 640 075	22
in the HeI-band	3 044 692	41
in the U and HeI-band	1 002 856	13
after UV-excess selection	13 881	0.2



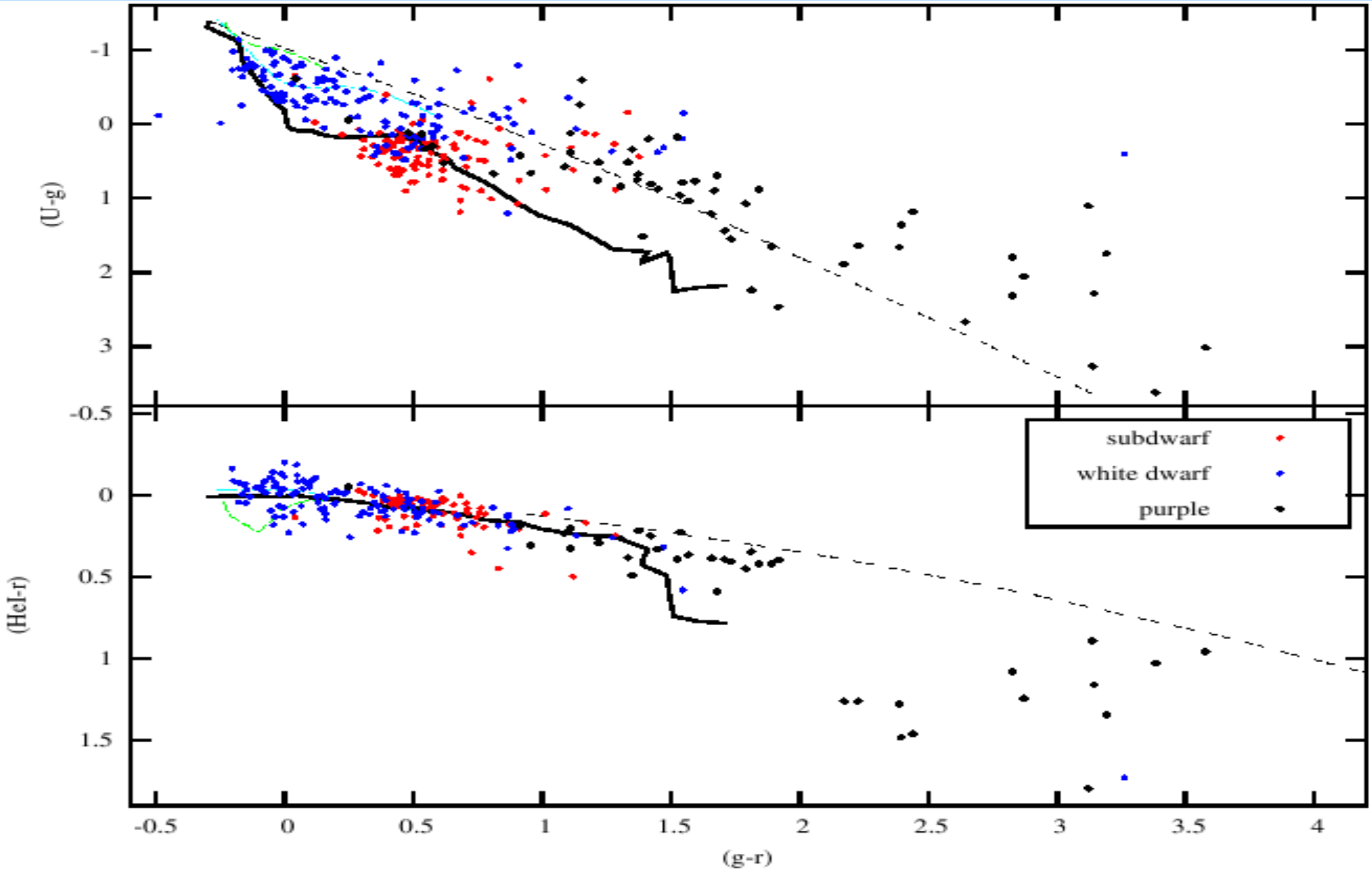
Conclusions and results

First catalogue of 12969 unique UV-excess candidates:
- 2366 “white dwarf” candidates
- 9896 “subdwarf” candidates
- 749 “purple” candidates

On average 11 “white dwarf” candidates per sq.deg

From cross-matching: more than 98% are unidentified sources.

Spectroscopic follow-up of UV-excess candidates



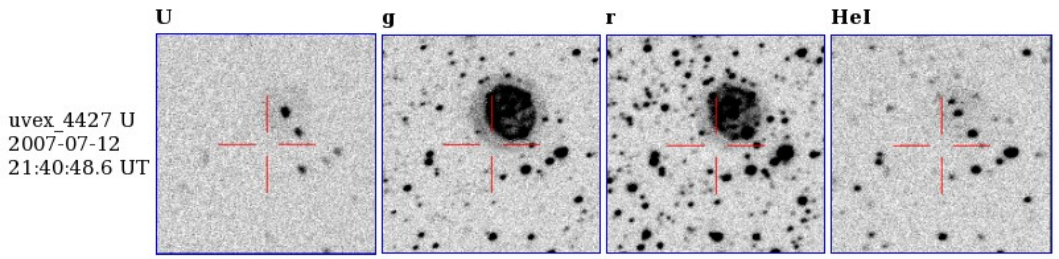
Spectroscopic follow-up of UV-excess candidates

There are ~300 UV-excess spectra (WHT/Fast/Hecto):

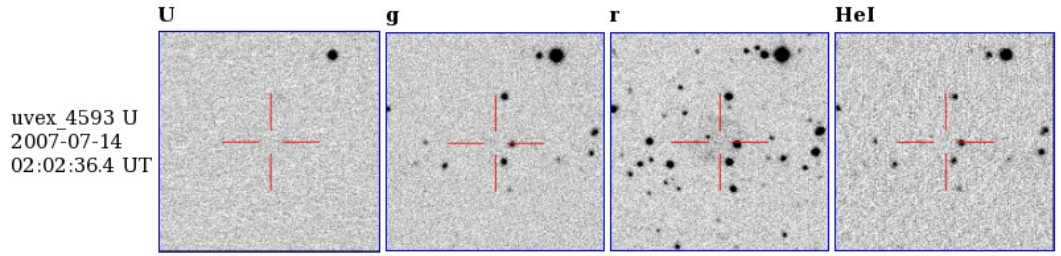
~60 DA white dwarfs, ~6 DB white dwarfs, QSO (z~2), ~50 Halpha emission sources (Classical T Tauri stars,
Be stars, CVs), M-type TiO stars, Carbon stars, subdwarfs and slightly reddened early-type stars.

34 PNe (Kohoutek, 2001) in the reduced UVEX data:

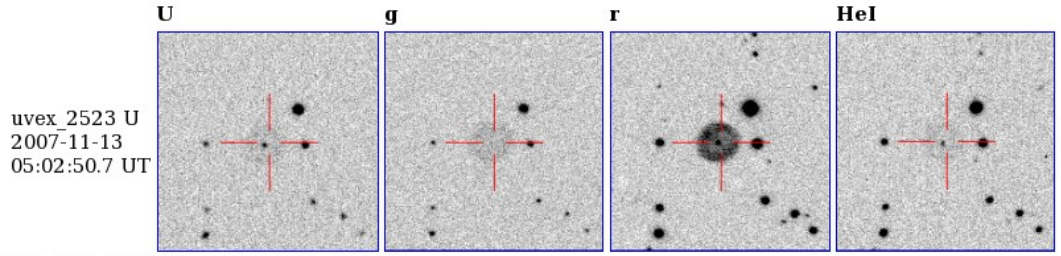
19:02:18.12 +10:17:24.1



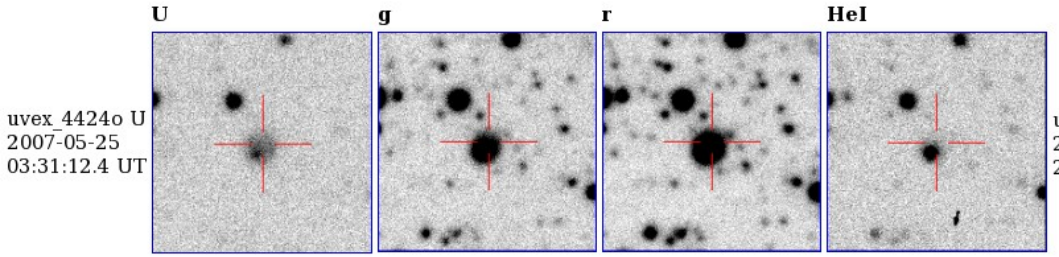
19:09:13.48 +07:05:43.1



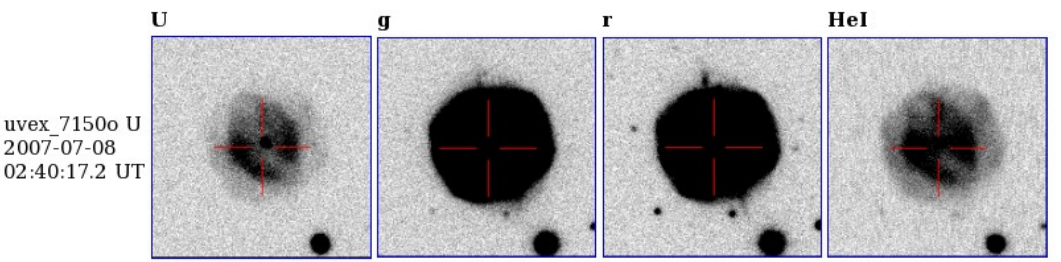
05:31:35.80 +28:58:41.7



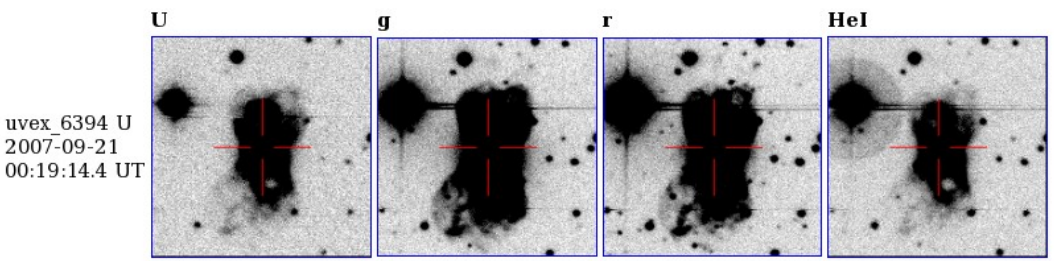
19:02:40.29 +14:28:51.9



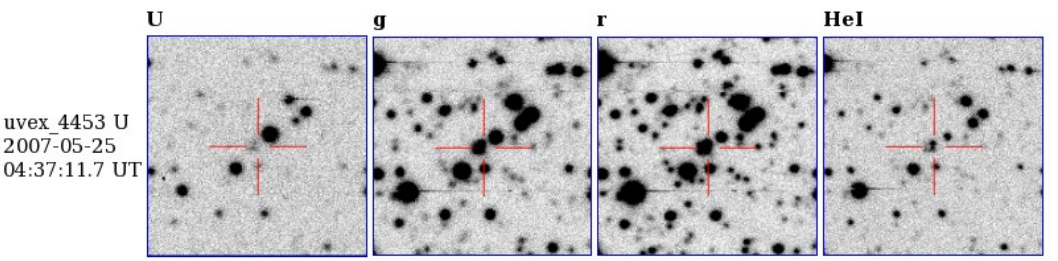
22:40:20.01 +61:17:07.3



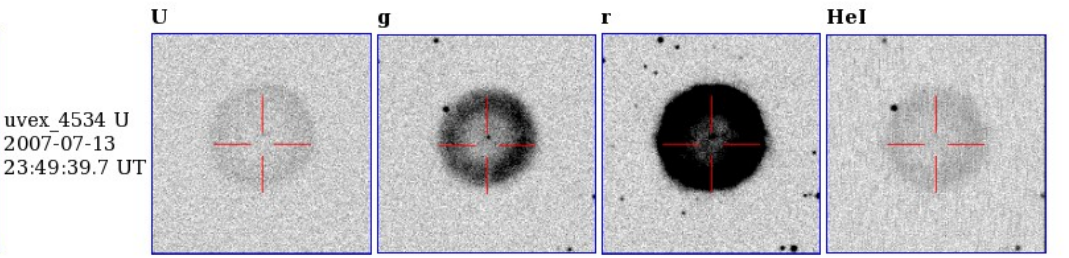
21:06:18.69 +47:51:09.3



19:03:10.34 +14:06:56.0

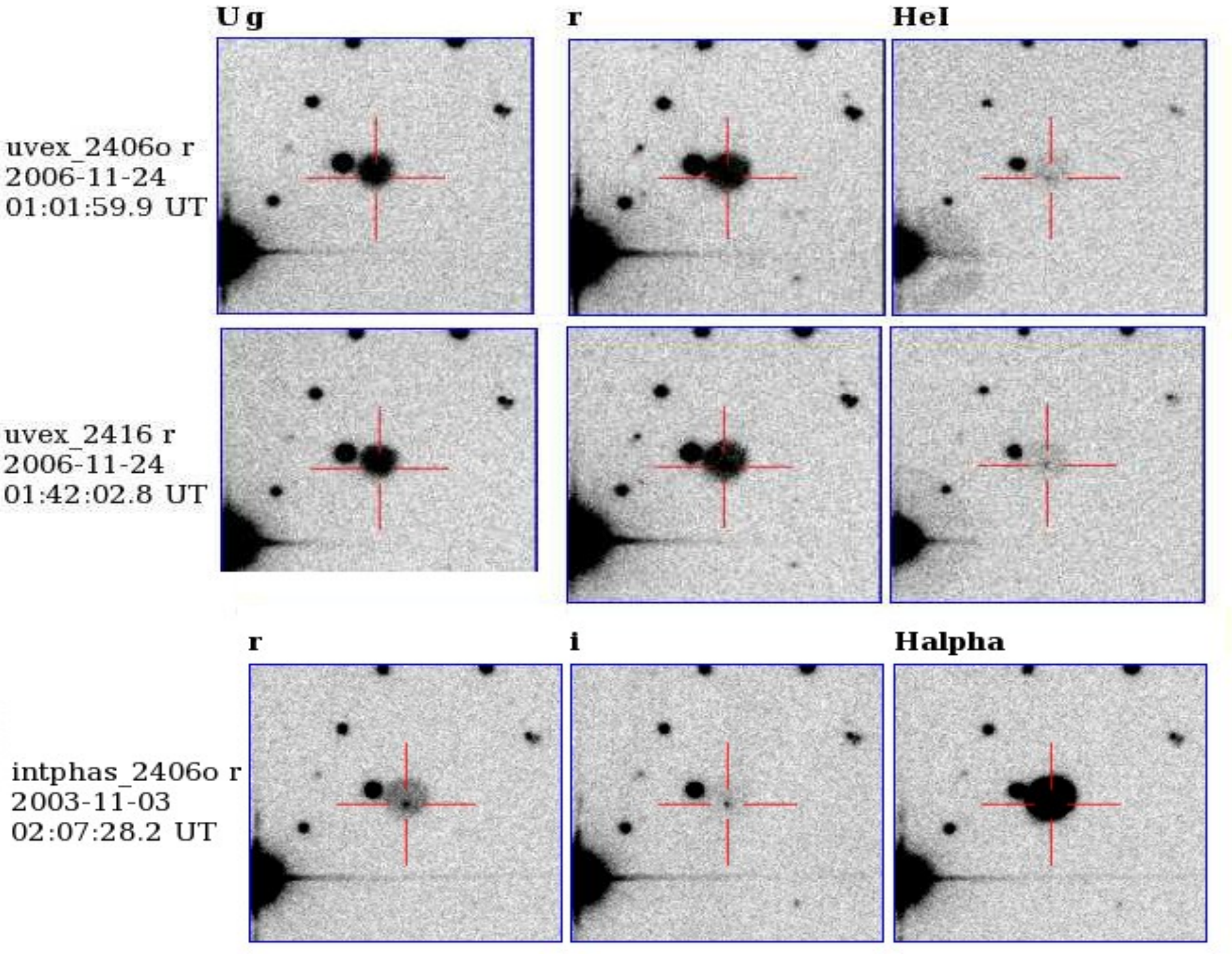


19:06:45.94 +06:23:50.8

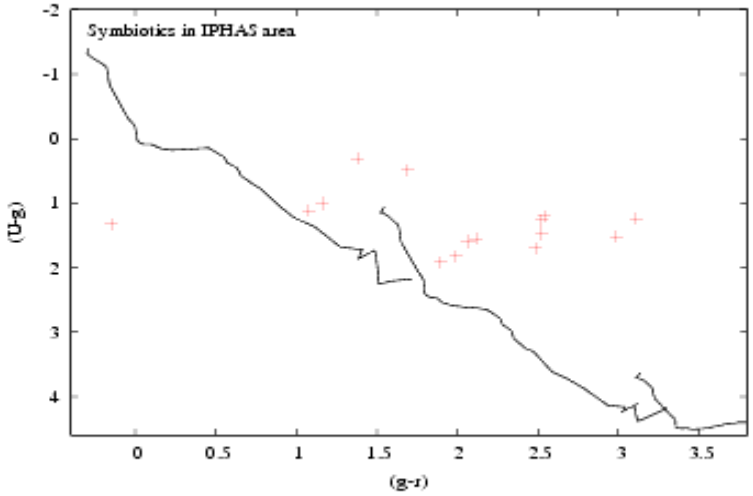


05:25:31.19 +28:19:45.1

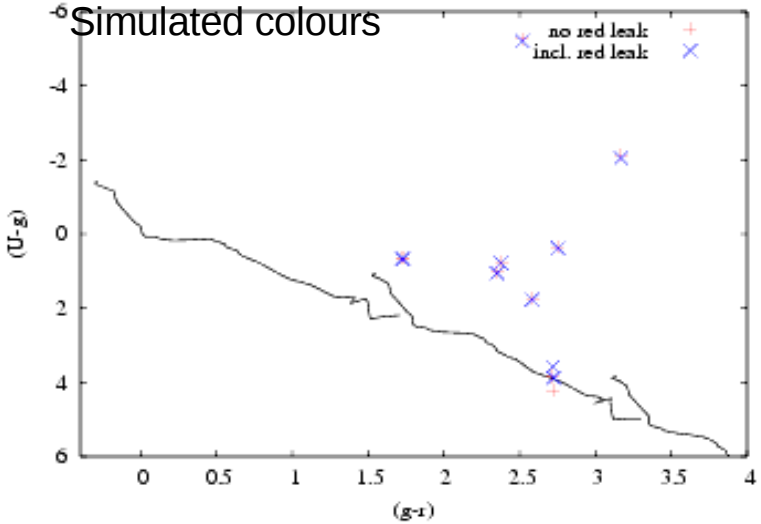
r=18.85, g=19.61, U=21.17, HeI=*

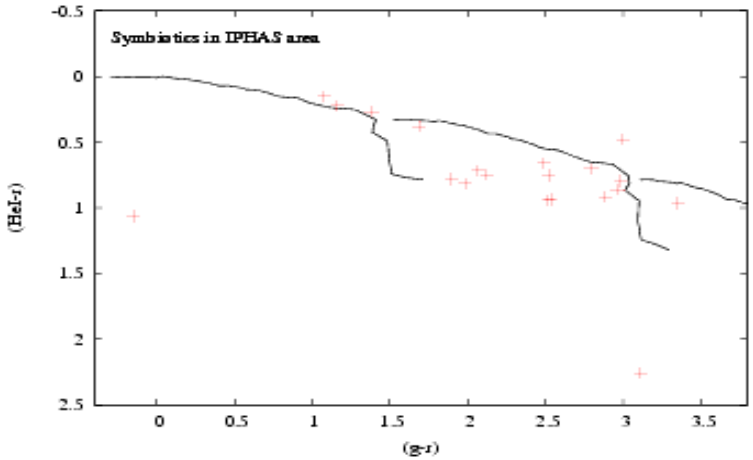


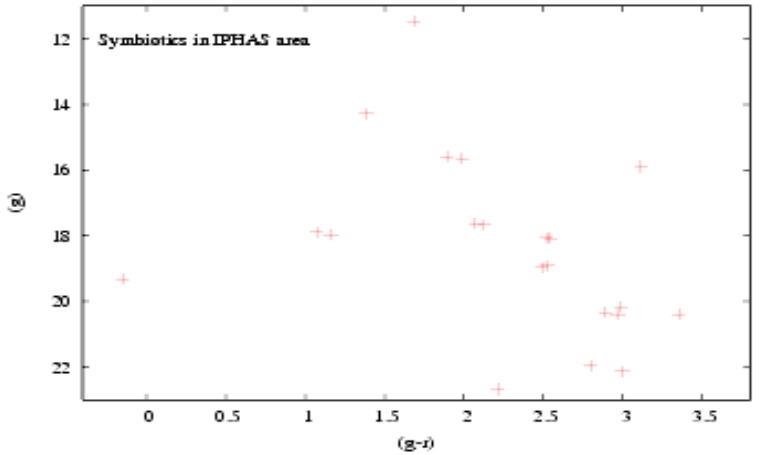
UVEX data available for Symbiotics in IPHAS area



Simulated colours





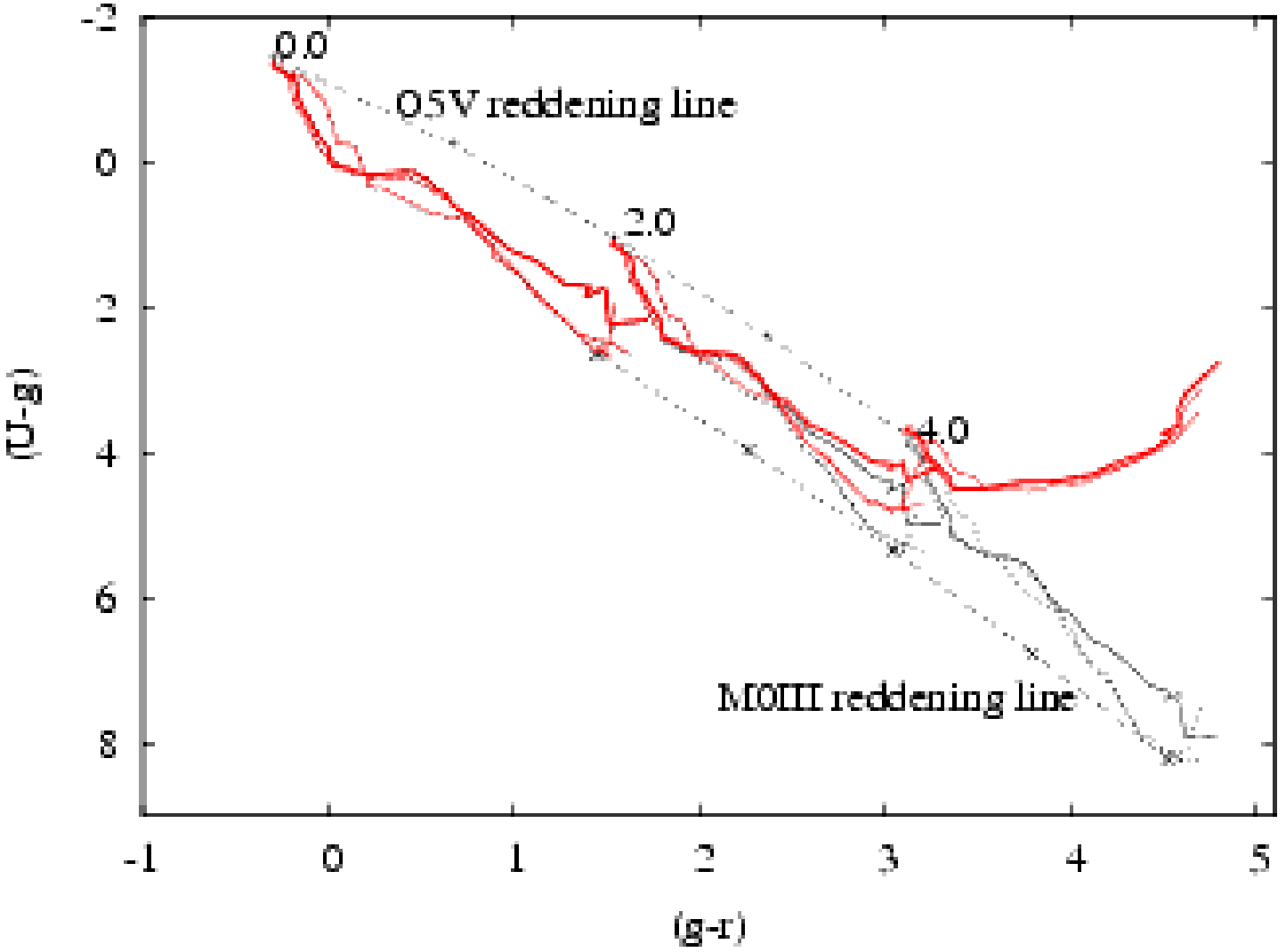


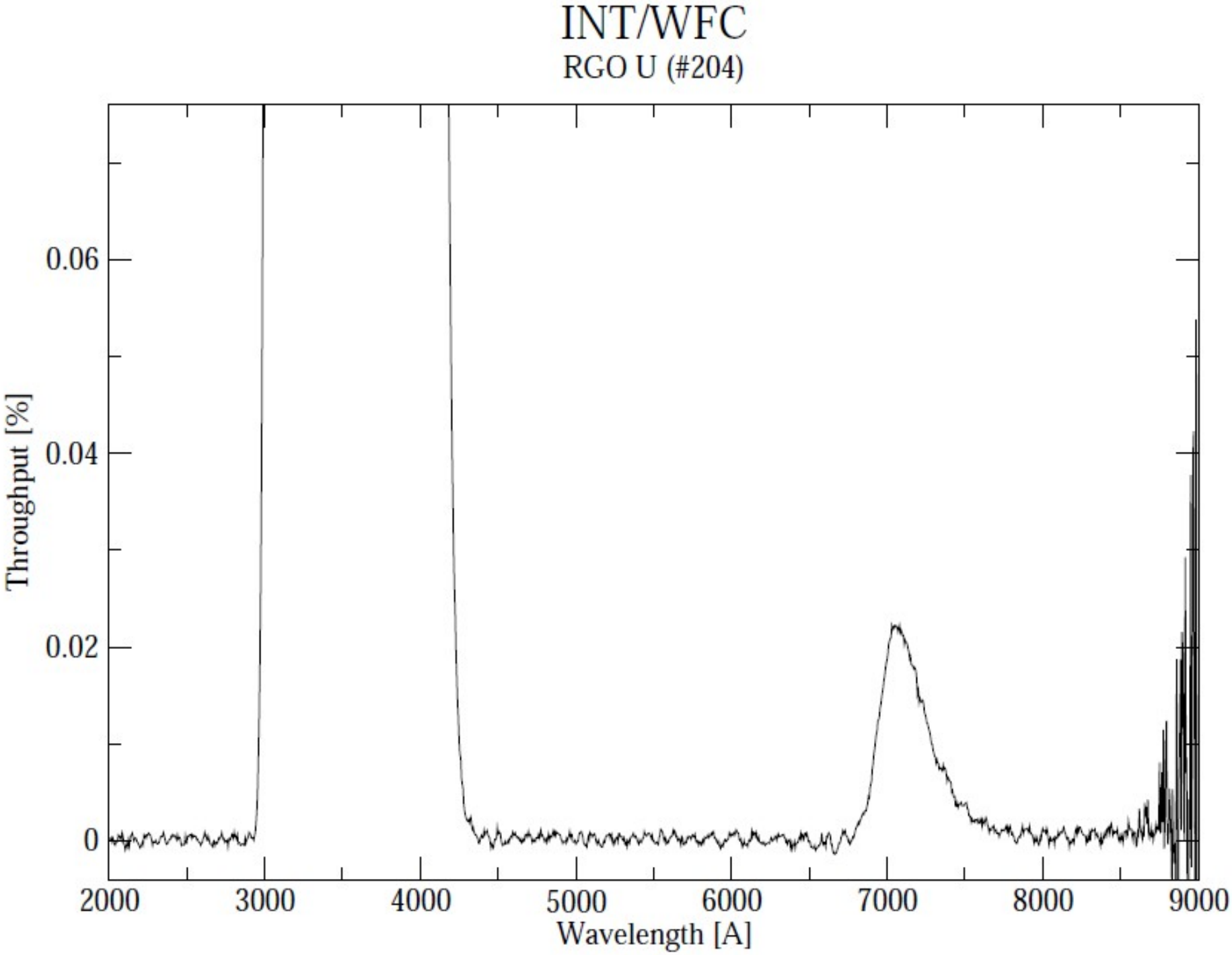
Thank you!

Contact: K.Verbeek@science.ru.nl

Tunc Tezel

The U-band filter Red Leak: New synthetic (U-g) colours




INT/WFC
RGO U (#204)
Throughput [%]
0.06
0.04
0.02
0
2000
3000
4000
5000
6000
7000
8000
9000
Wavelength [A]