Digging-Out Twin Binary Systems From the ASAS Catalogue and Determining Their Stellar Parameters

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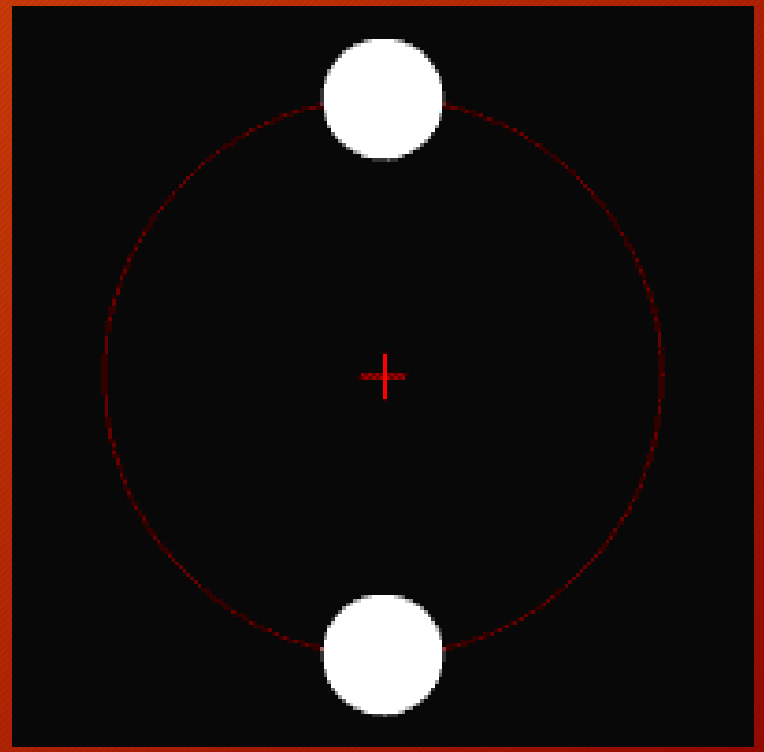
Overview

- What is a twin-binary system?
- Theories about how they form
- Recent study about their spectral type
- ASAS Catalogue
- Telescopes
- Pre-results
- Next step

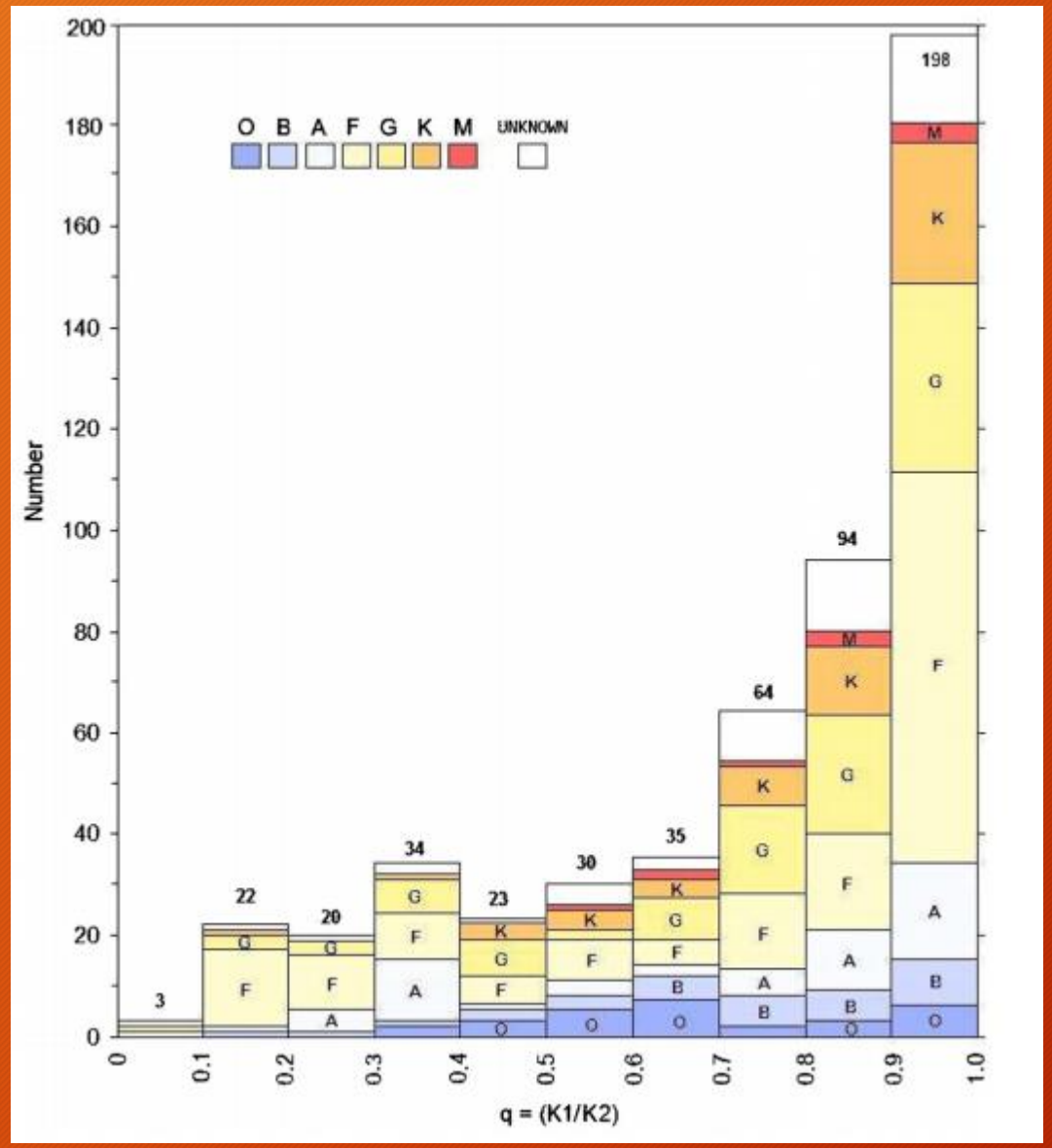
Twin-Binary Systems

- Same Spectral Type and Luminosity Class
- Same Mass and Radii (Mass ratio ~ 1.0)
- Same Temperature
- Similar Rotational Velocity



How twin-binaries are being formed?

- Mass Transfer through Lagrangian Points
- Fission/Fragmentation (Lucy and Ricco, 1979)
- Accretion (Bate, 2000)



Simon and Obbie, 2007

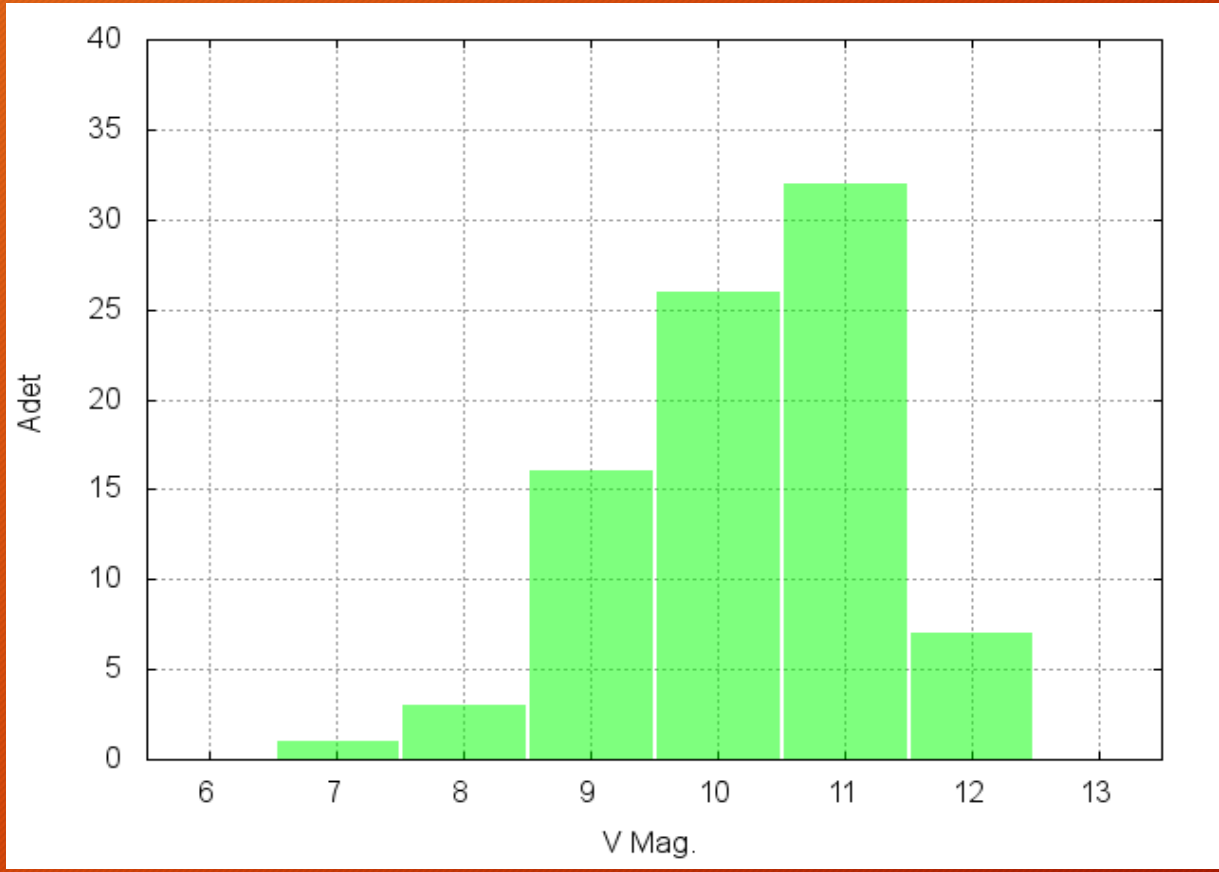
the ASAS Catalogue

- Vmag < 14
- Stars > 10^7
- Johnnson V-I bands
- Main purpose: Catalogue variable stars
- Same equipment
- Long term (No Selection Effect)

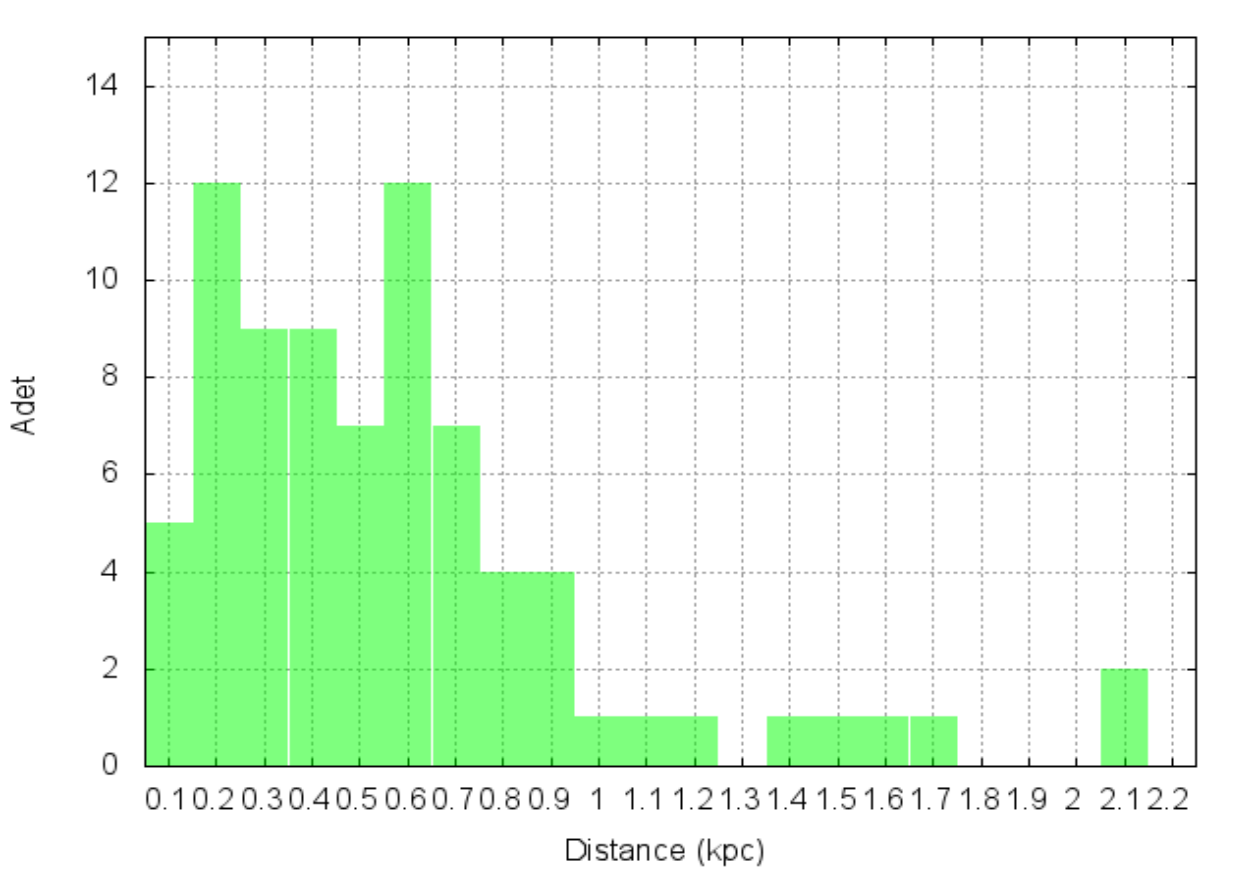
How we had selected twin candidates?

- By Light Curves from ASAS Catalogue
- Algols
- Similar depths of minima
- Similar shapes of minima
- Northern Hemisphere

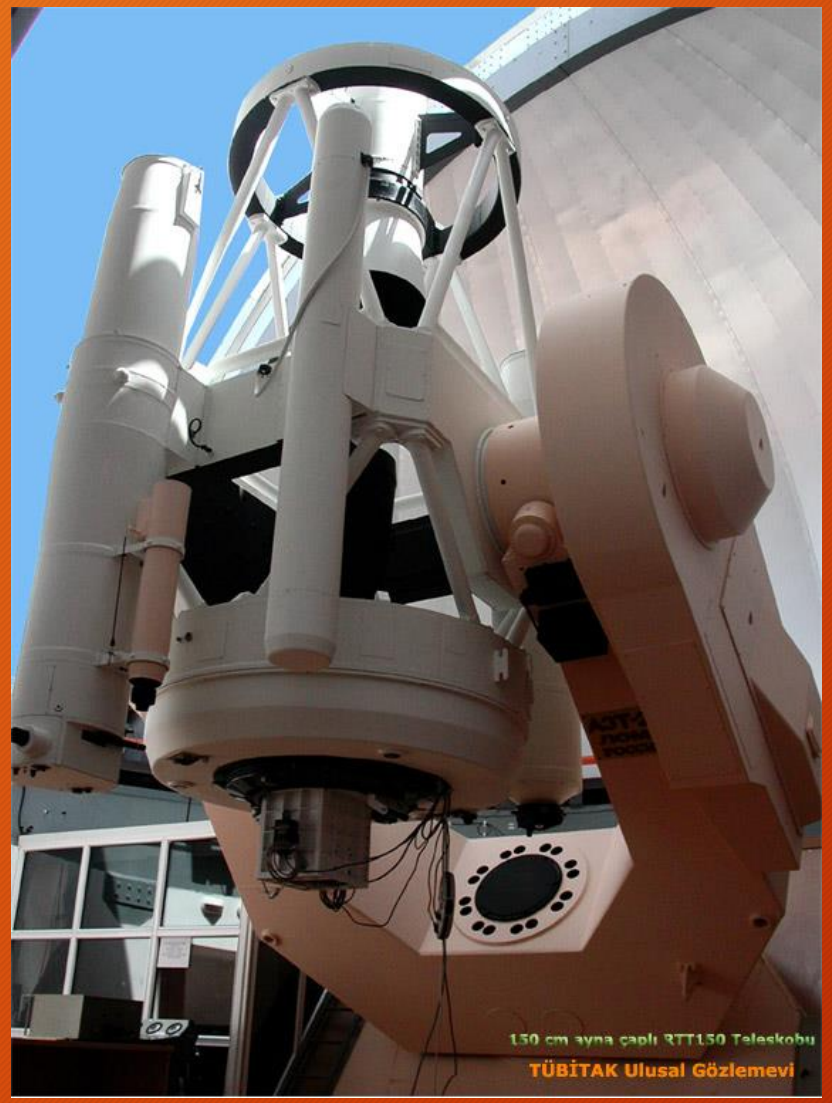
Magnitudes of Observed Twins according to SIMBAD



Distance of observed twins according to GAIA DR2



Telescopes



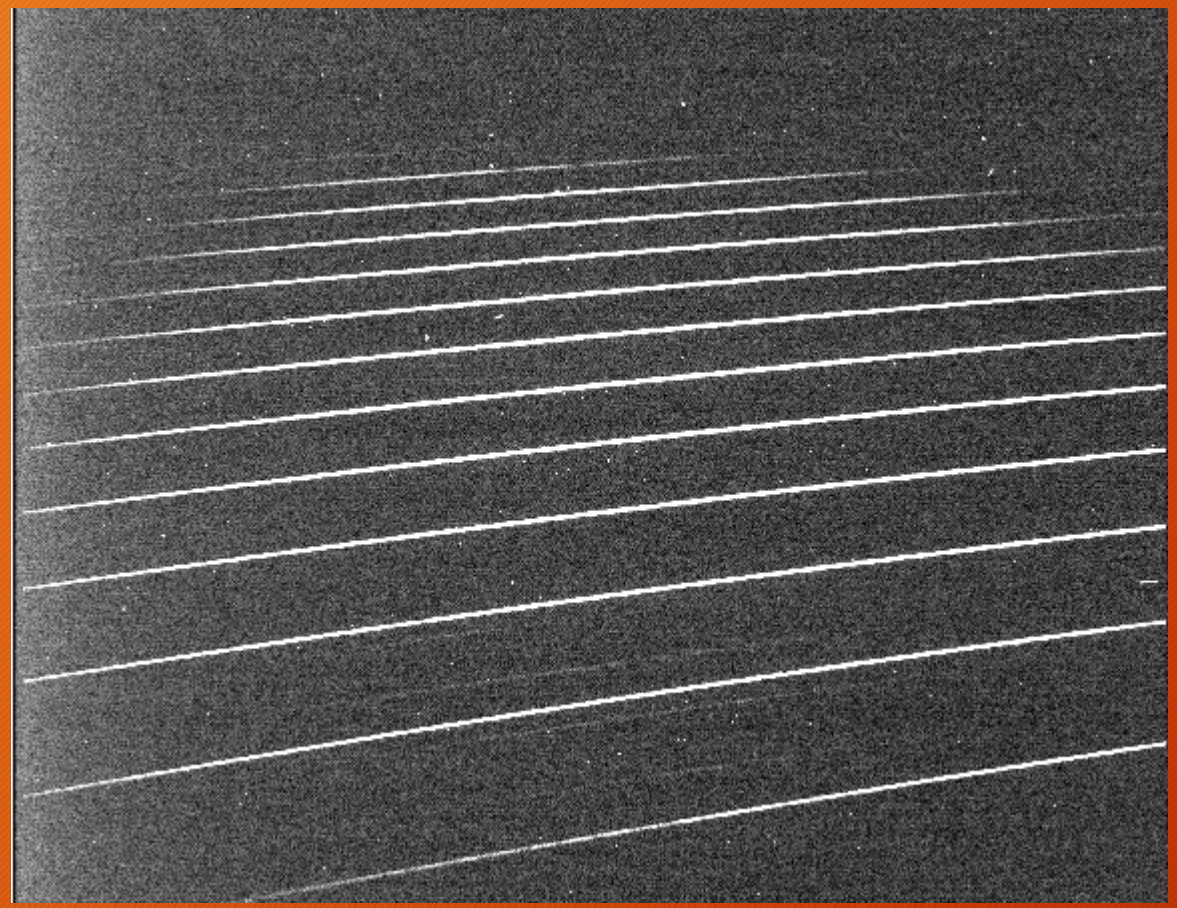
Turkish National Observatory RTT150

- 1500 mm
- 11611 mm
- F/7.7

- Bessel (UBVRI)
- Sloan (u´g´r´i´z´)

- R ~5000
- 3350-9500 Å

RTT150

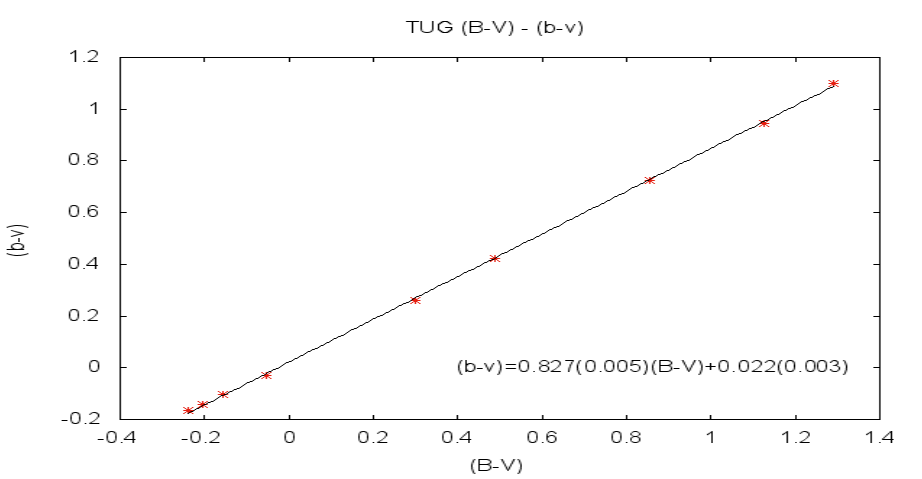


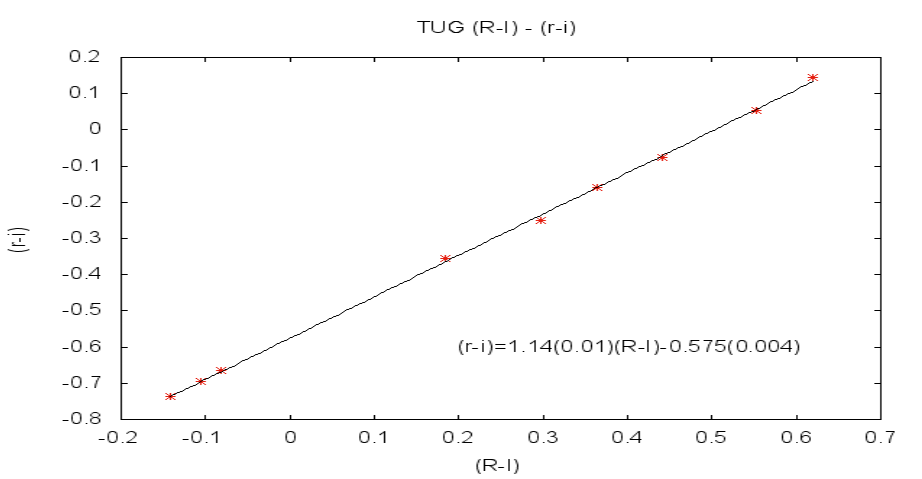
Telescopes

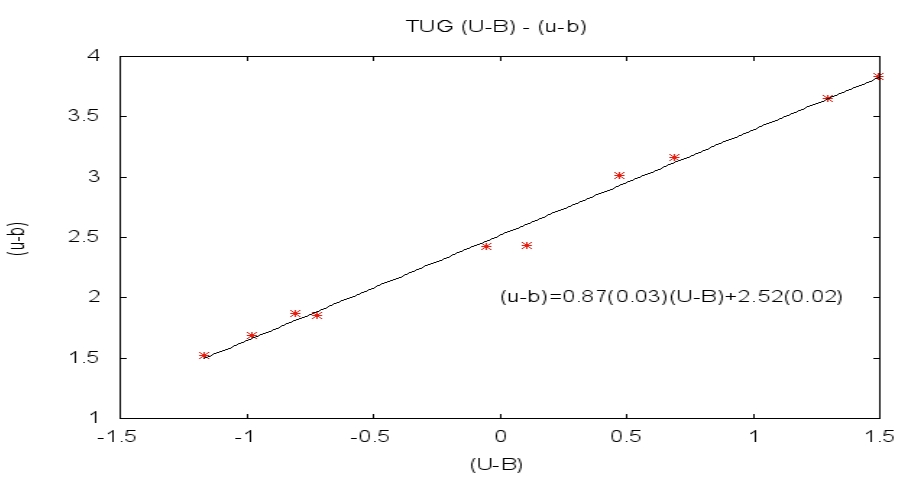
Turkish National Observatory T100

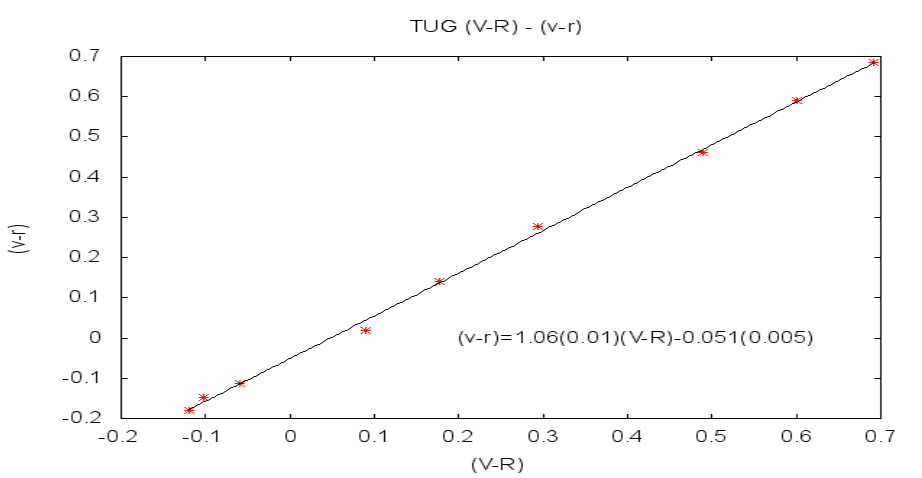
- 1000 mm
- 10000 mm
- F/10
- Johnson (UBVRI)
- Sloan (u´g´r´i´z´)

T100
Transformation Coefficients







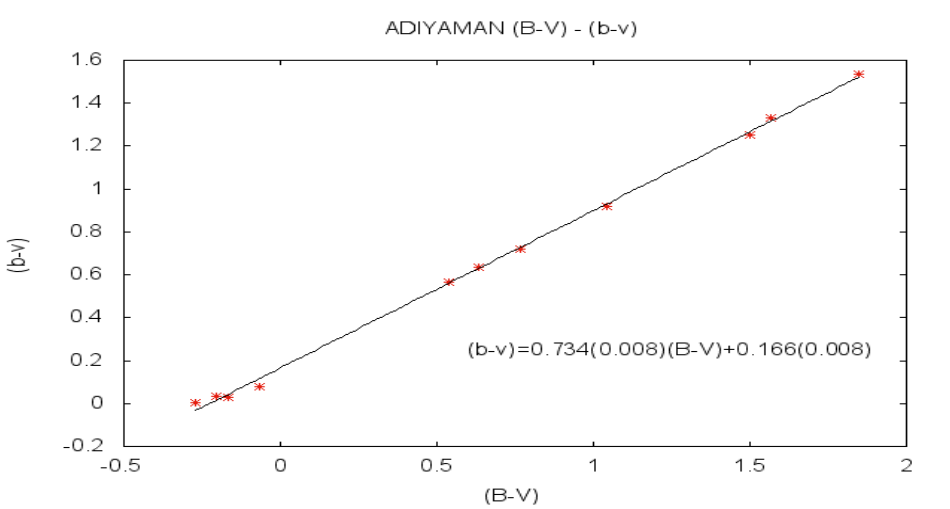


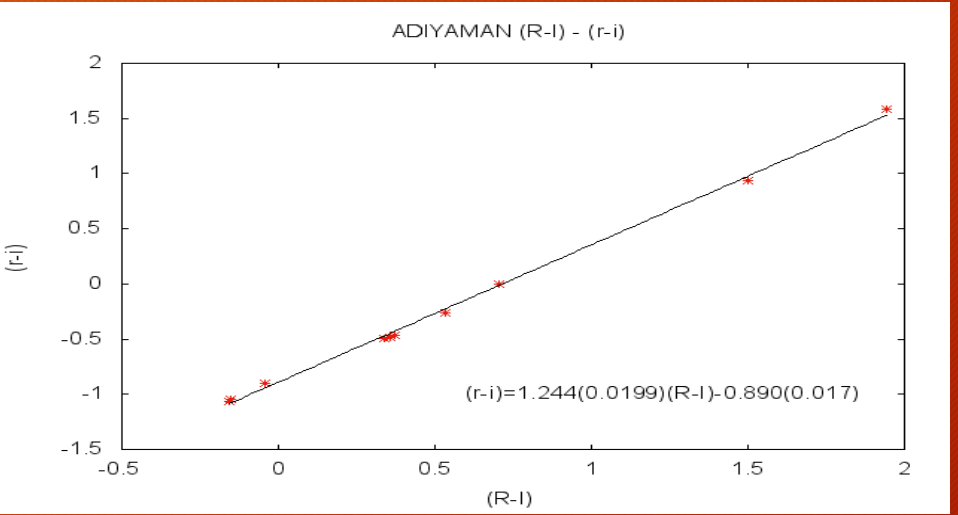
Telescopes

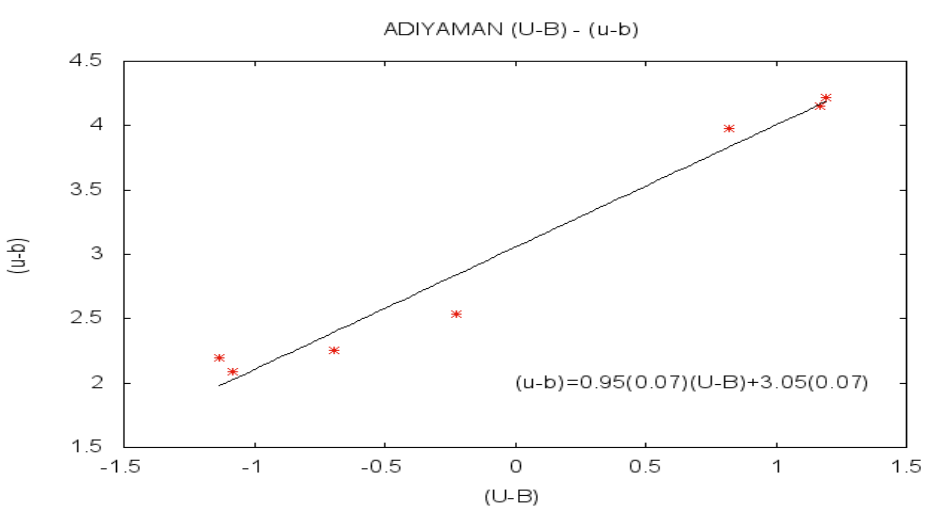
Adıyaman University ADYU60

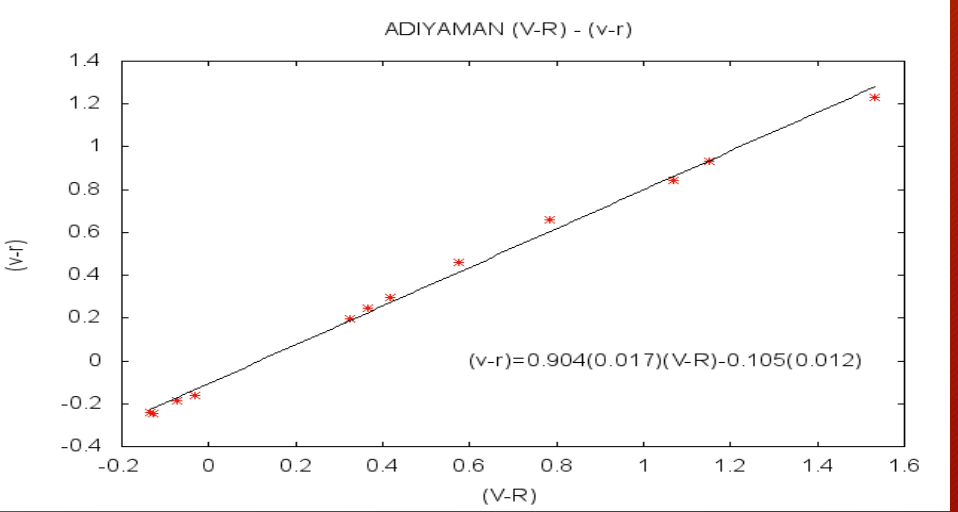
- 24” (610 mm)
- 156” (3962 mm)
- F/6.5
- 58’ (arcmins)
- Johnson (UBVRI)
- Sloan sdss (ugriz)

ADYU60
Transformation Coefficients









Telescopes

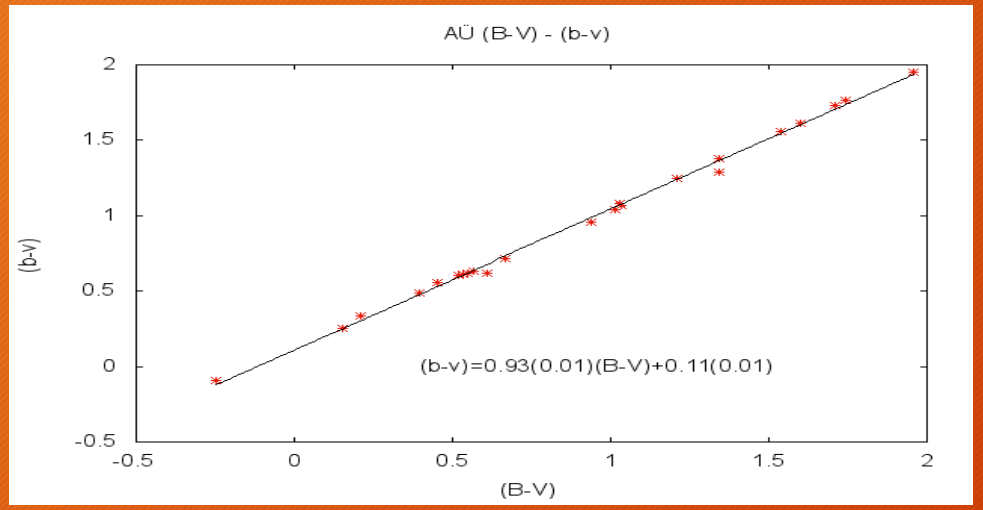
Akdeniz University AUBT60

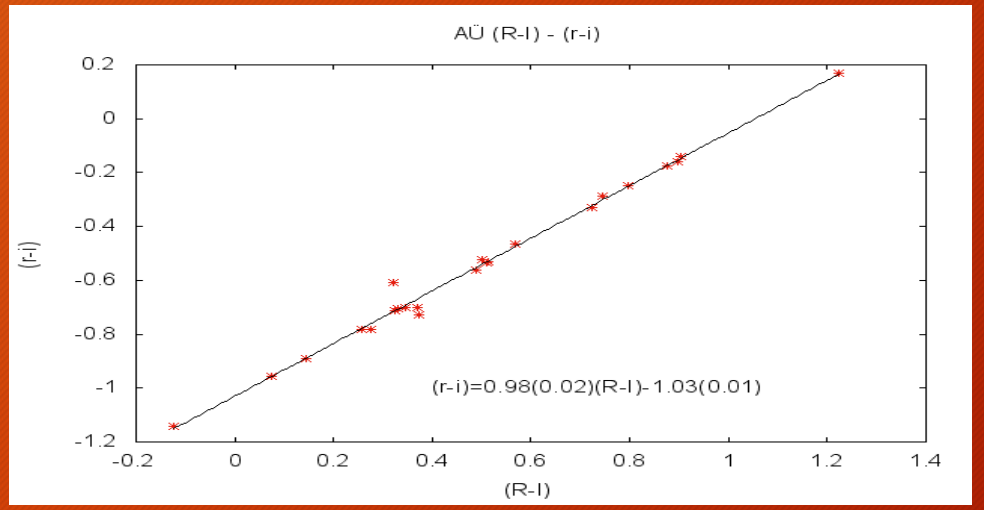
- 610 mm
- 3962 mm
- F/6.5

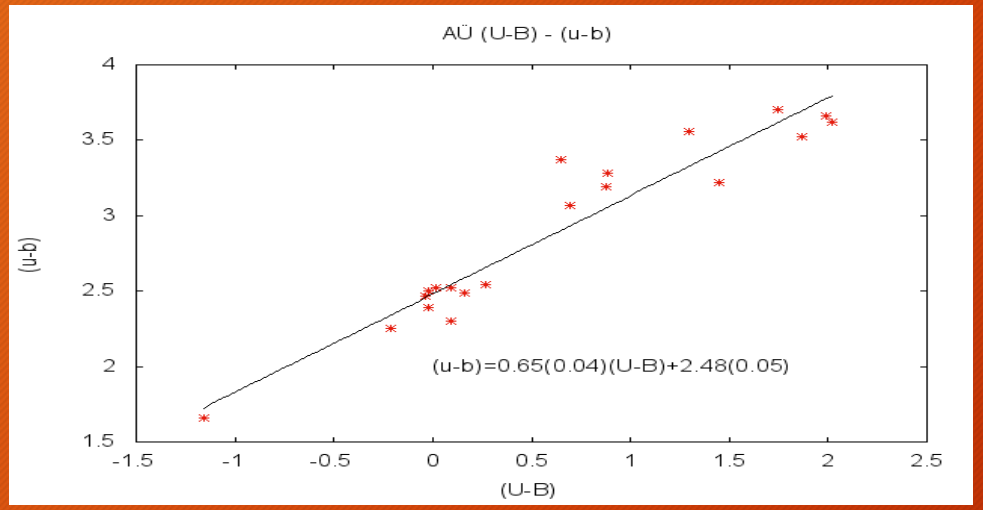
- Johnson (UBVRI)
- Sloan (u´g´r´i´z´)

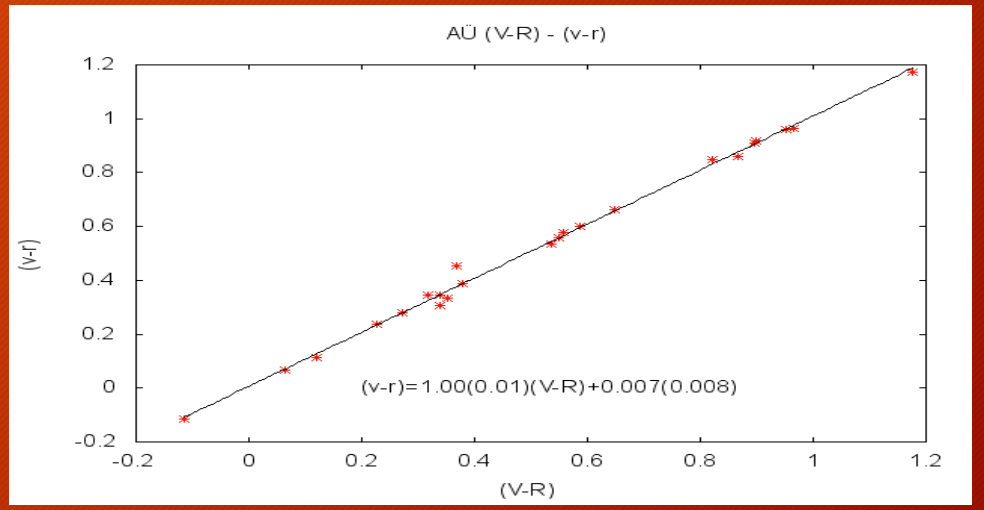
- R ~12000
- 3800-8100 Å

AUBT60
Transformation Coefficients









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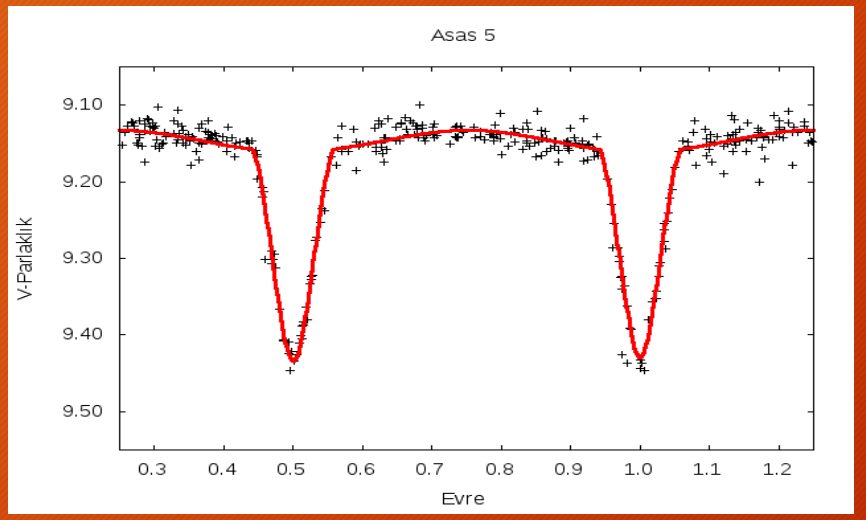

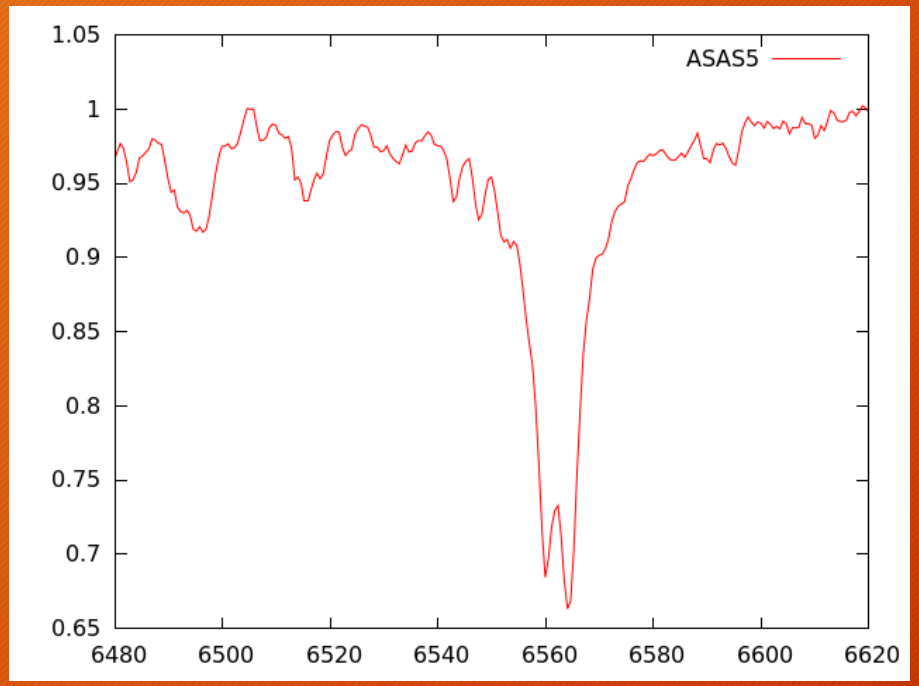

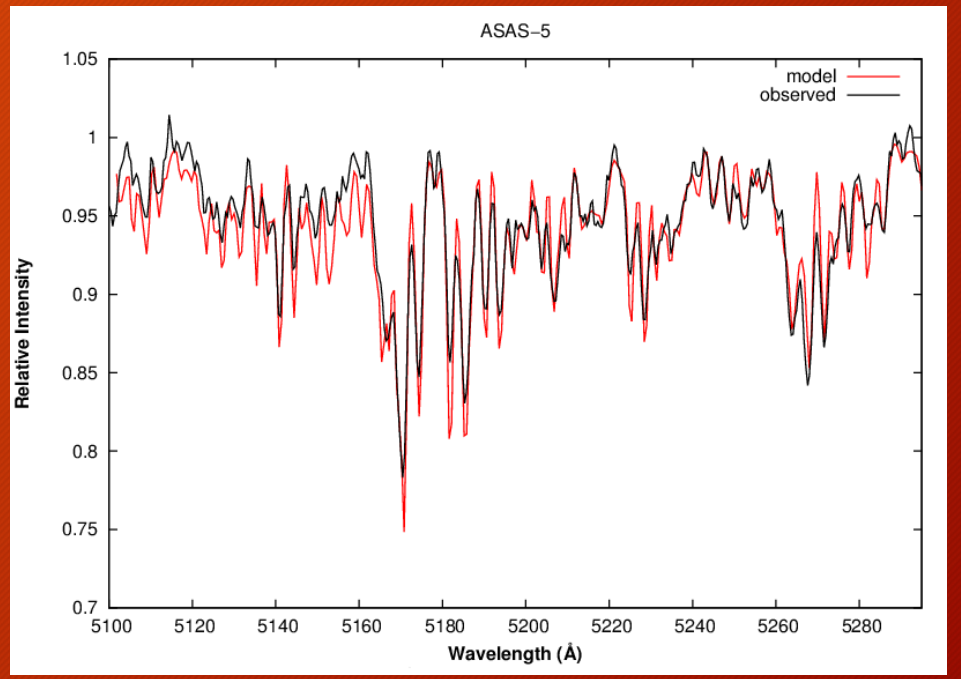

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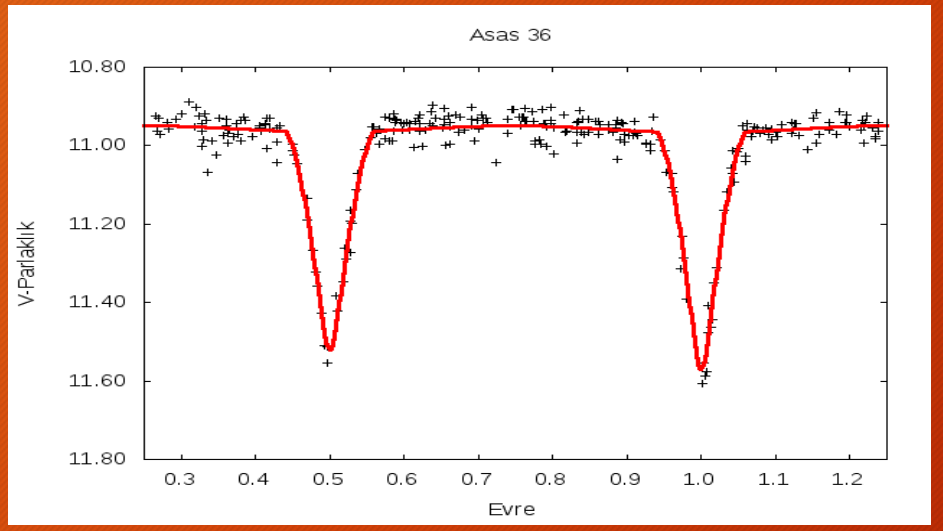
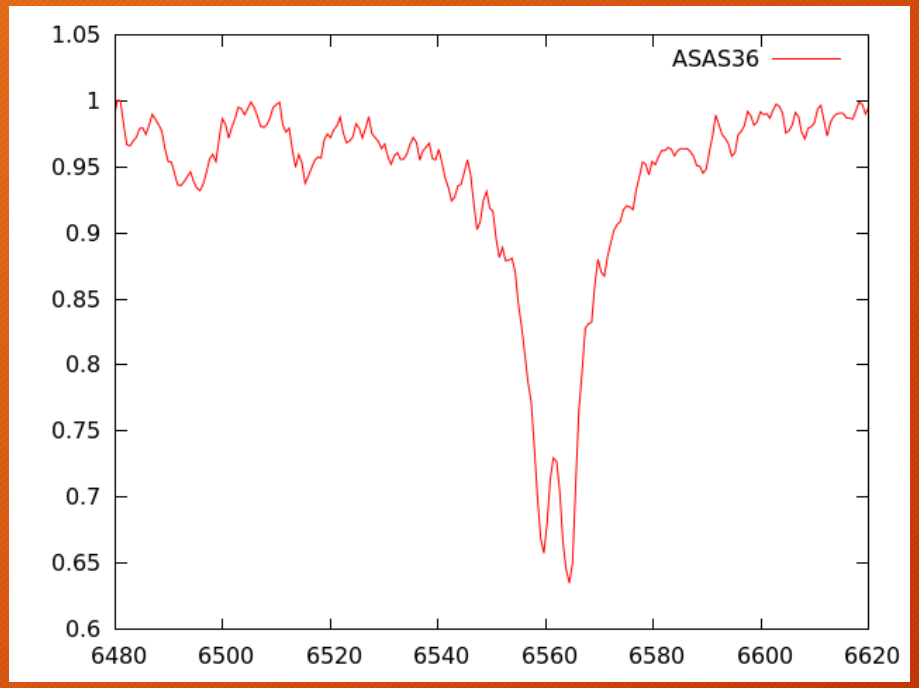
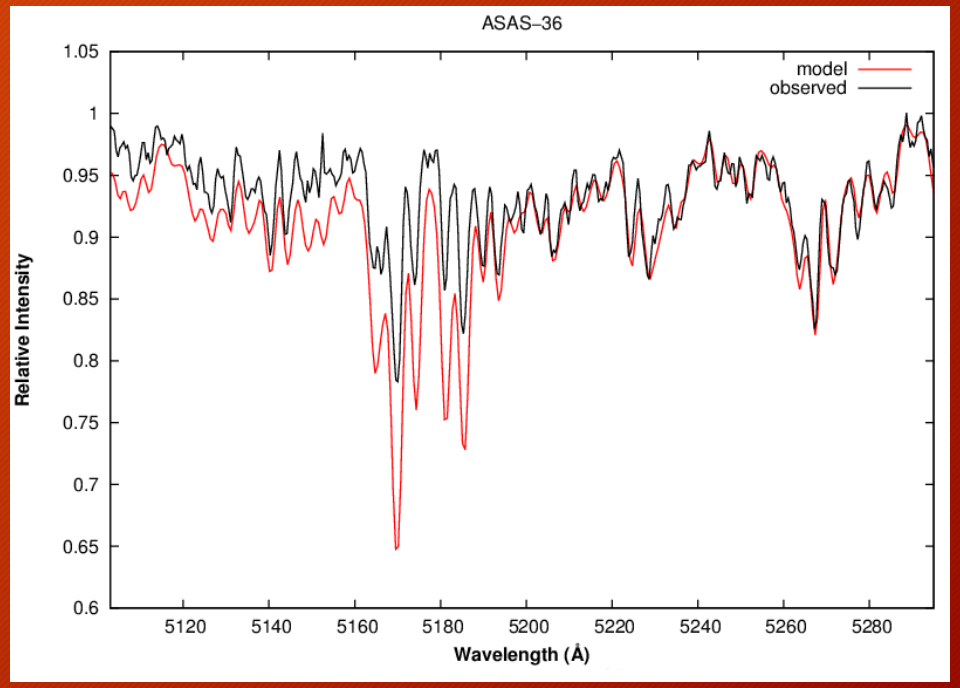
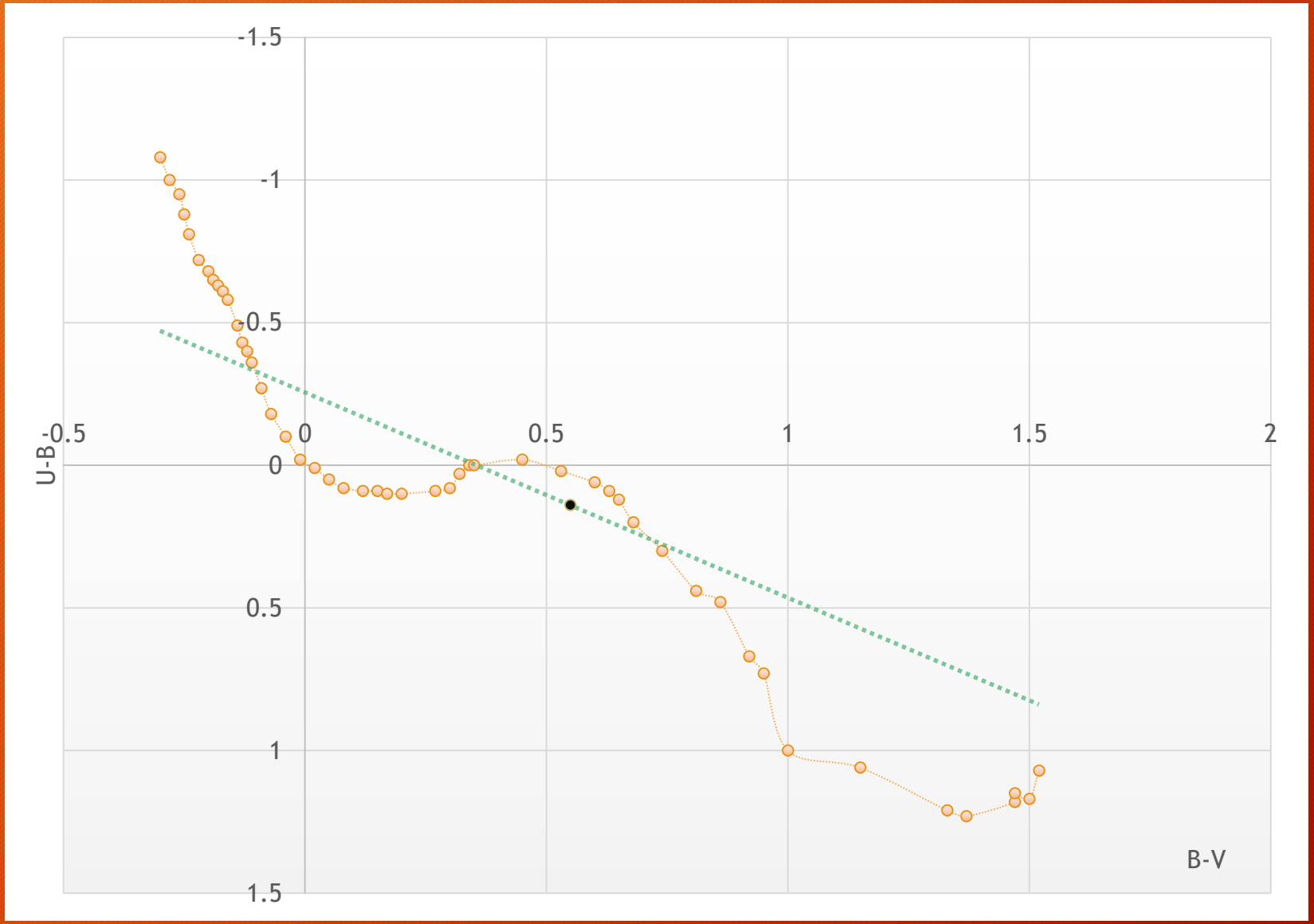
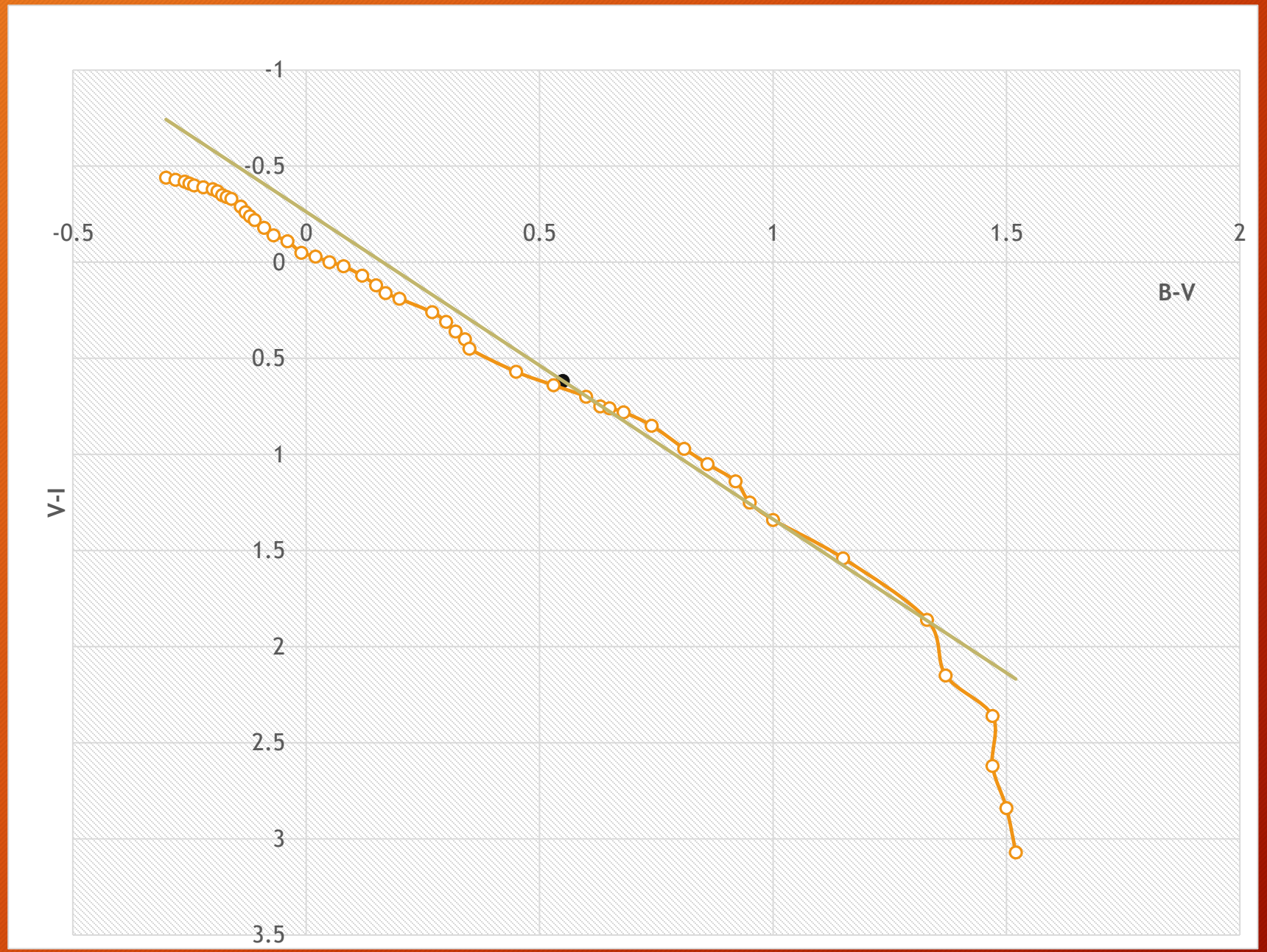






Colour- Colour Diagrams

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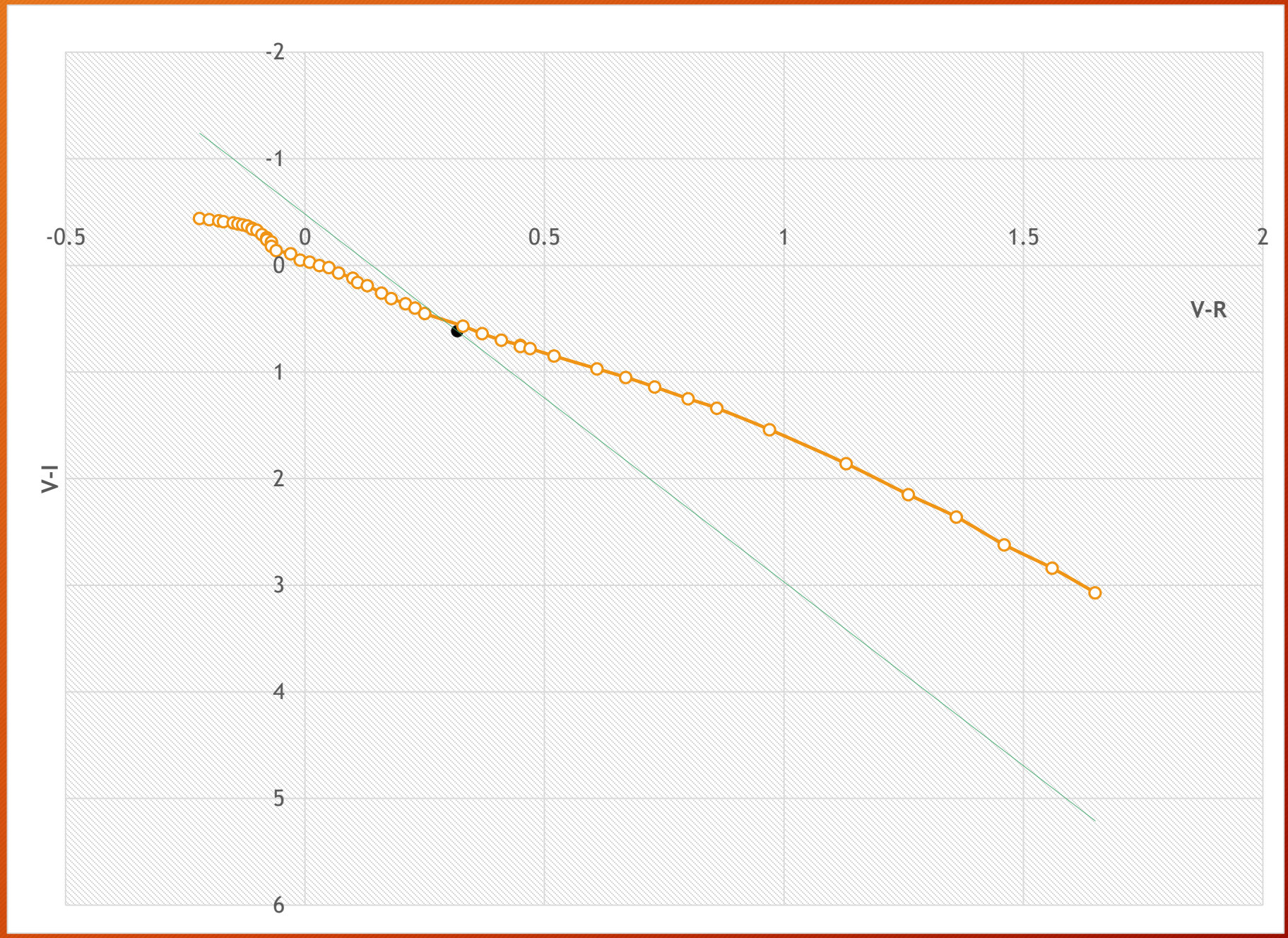
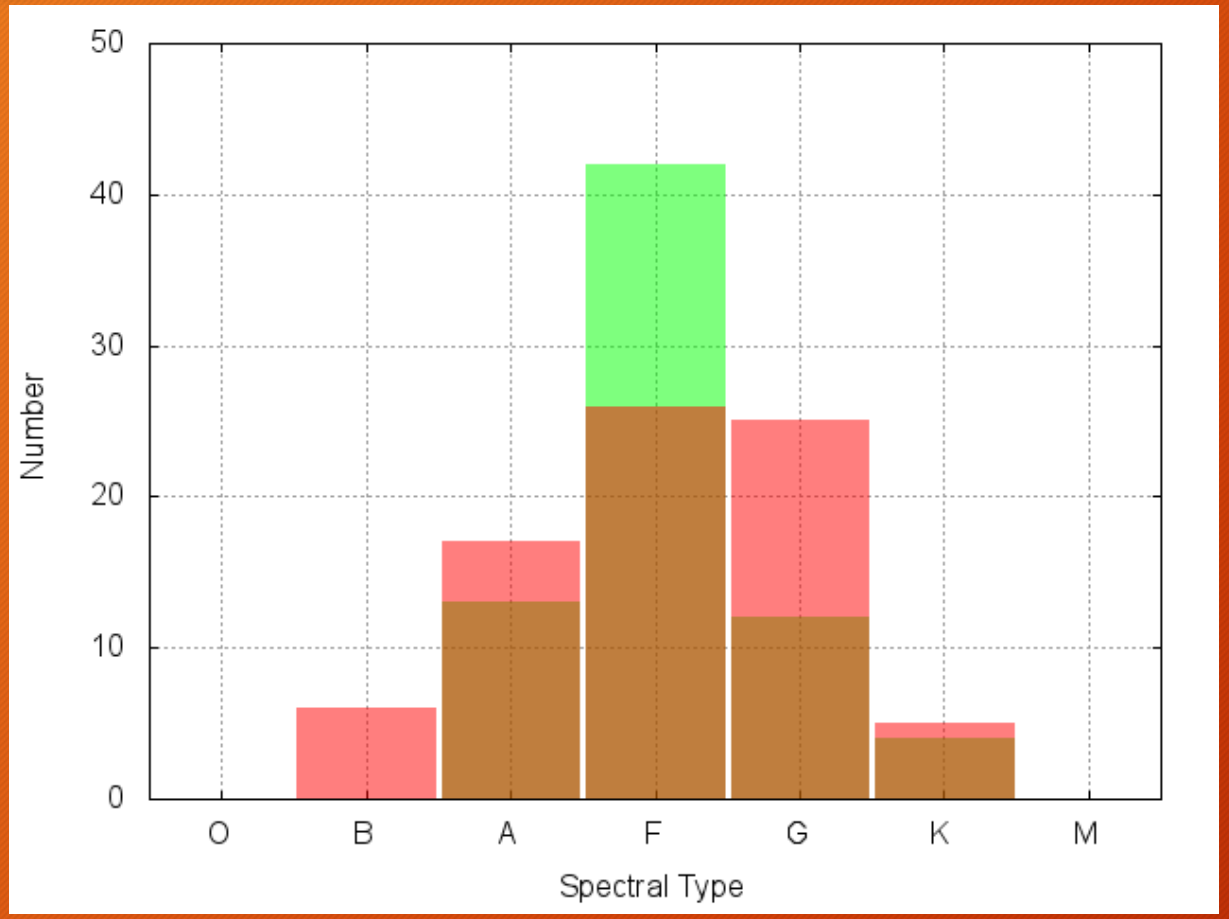
-0.5
0
0.5
1
1.5
2
2.5
3
3.5
V-I
-0.5
0
0.5
1
1.5
2
B-V

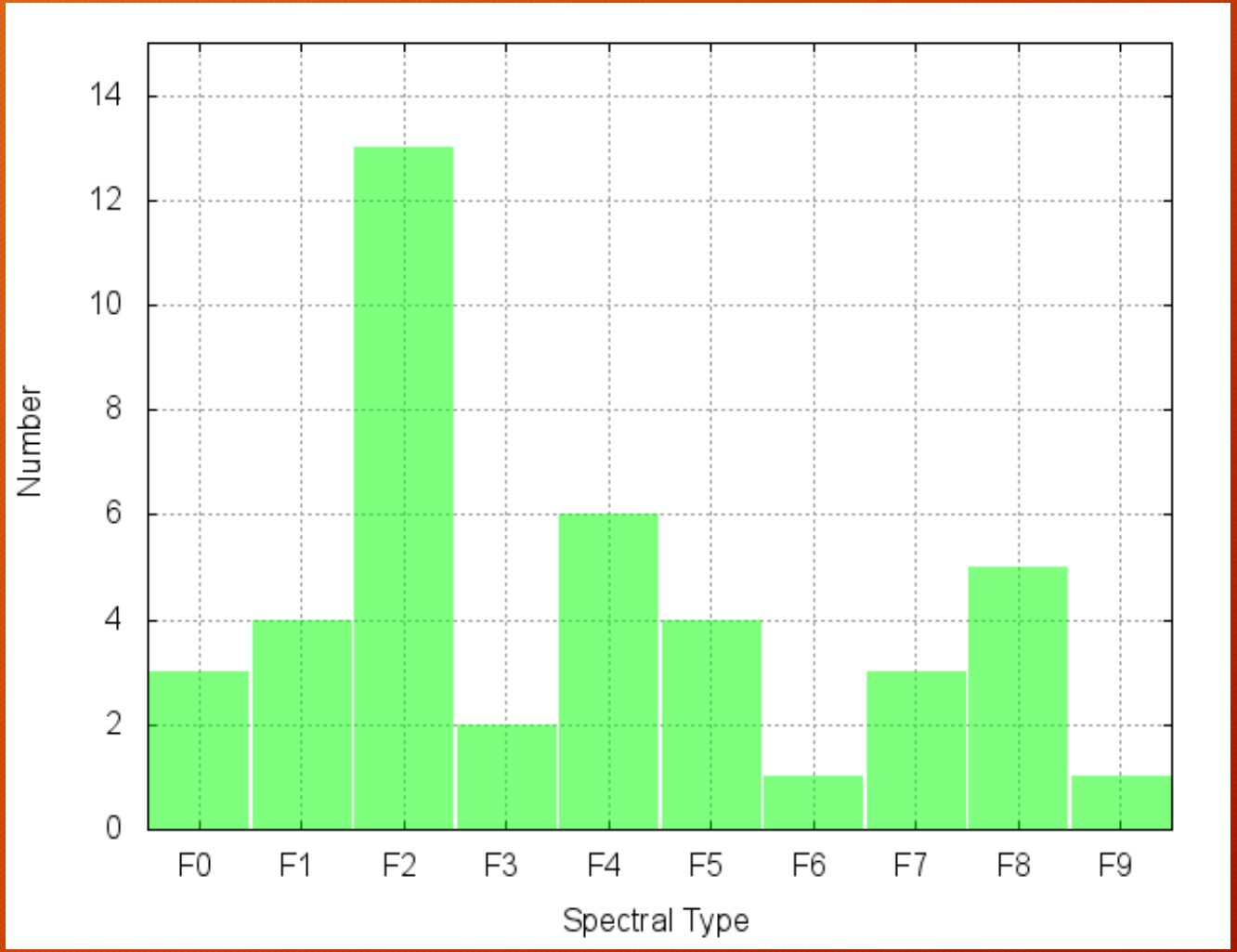

-2
-1
0
1
2
3
4
5
6
-0.5
0
0.5
1
1.5
2
V-I
V-R

Results



- Pink: According to GAIA
- Green: Our Study
- Brown: Overlapping

Spectral type distribution of observed F-type twins



Next job

- Find the stellar parameters of analyzed twin systems and make bulk publications of the results

- Looking for an explanation with teoric models about why there is a piling up around F2

Questions?