Video Camera Spectral Sensitivity

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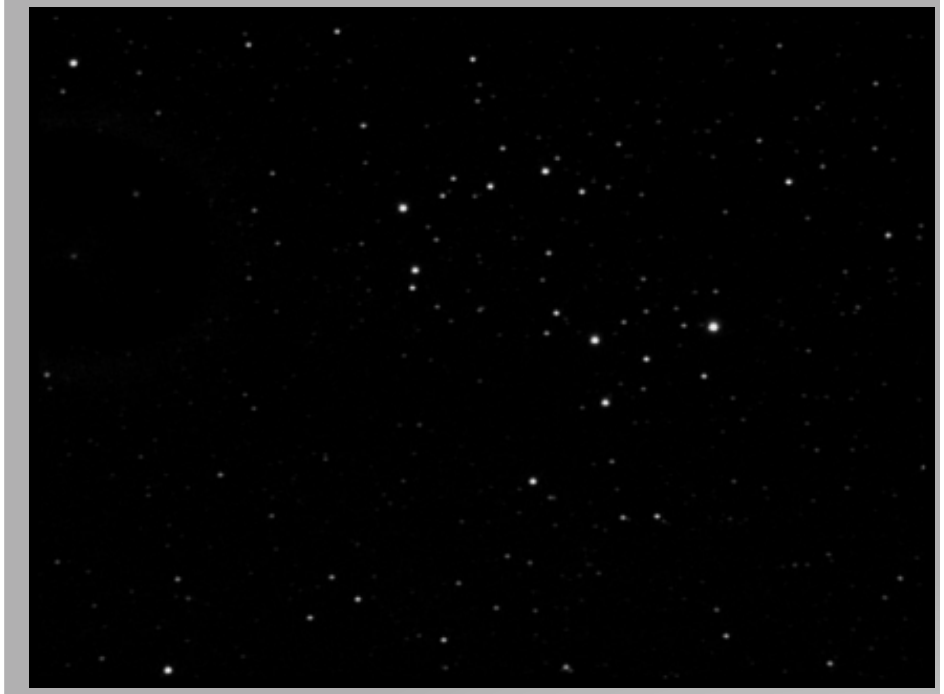
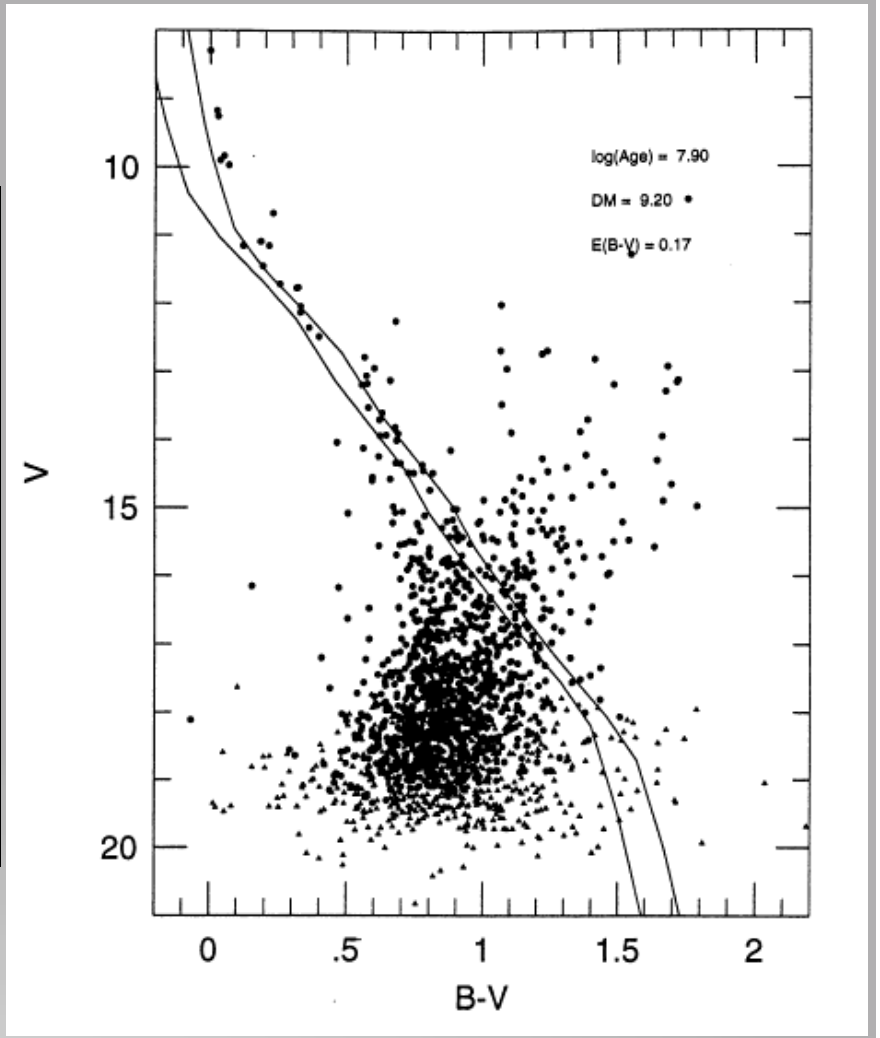
IOTA, WSAAG, Tangra Observatory

Lucky Star Kick-Off Meeting Workshop
Paris, 18-19 Apr 2016





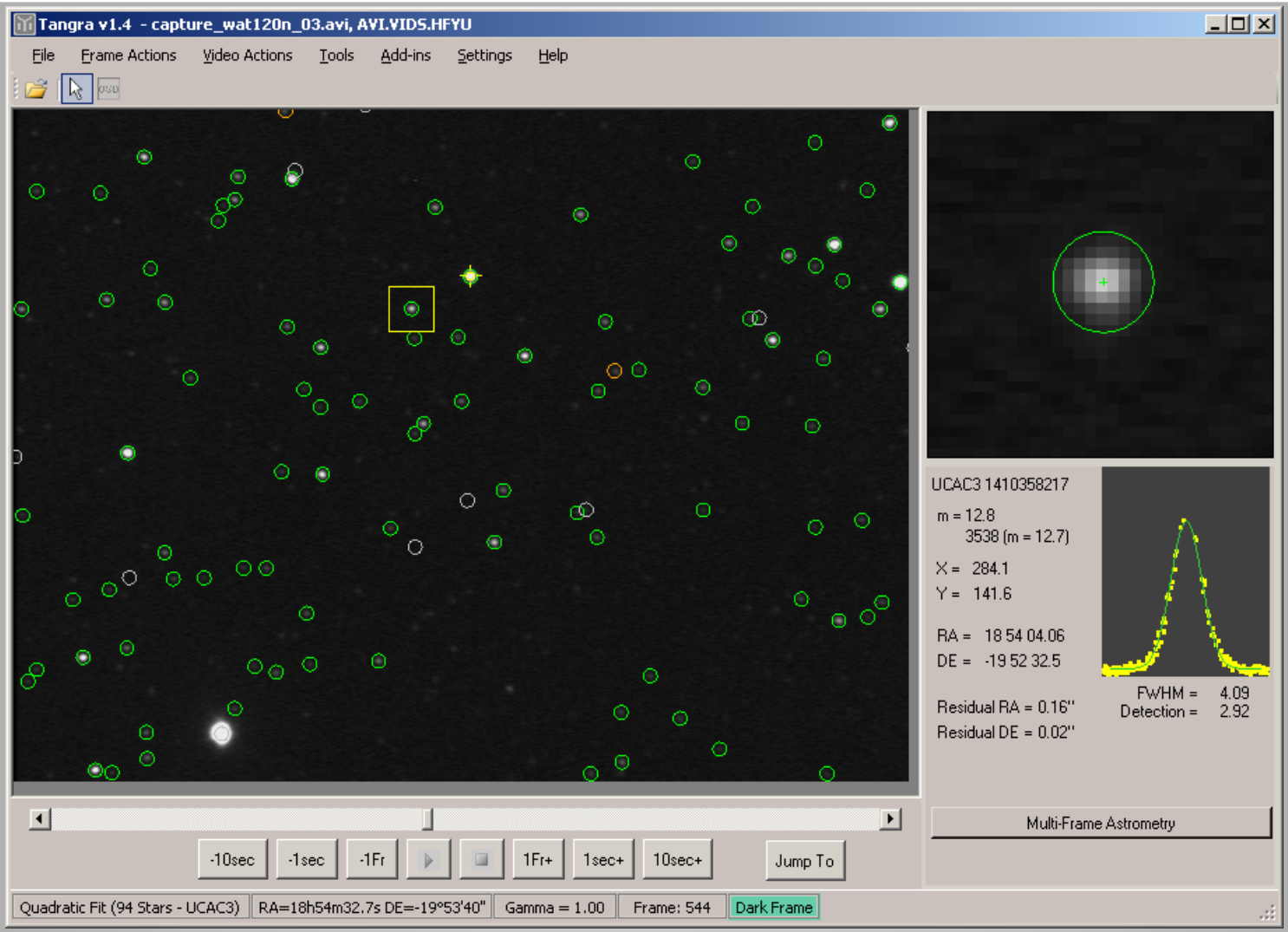
NGC 6716

- 14” LX200 ACF + F/3.3 FR
- Flea3, WAT120N+, WAT920H, PC164EX2
- AVer Grabber, VDub, HuffYuv & MPEG4
- SLOAN Photometric Filters
- ADVS

Equipment

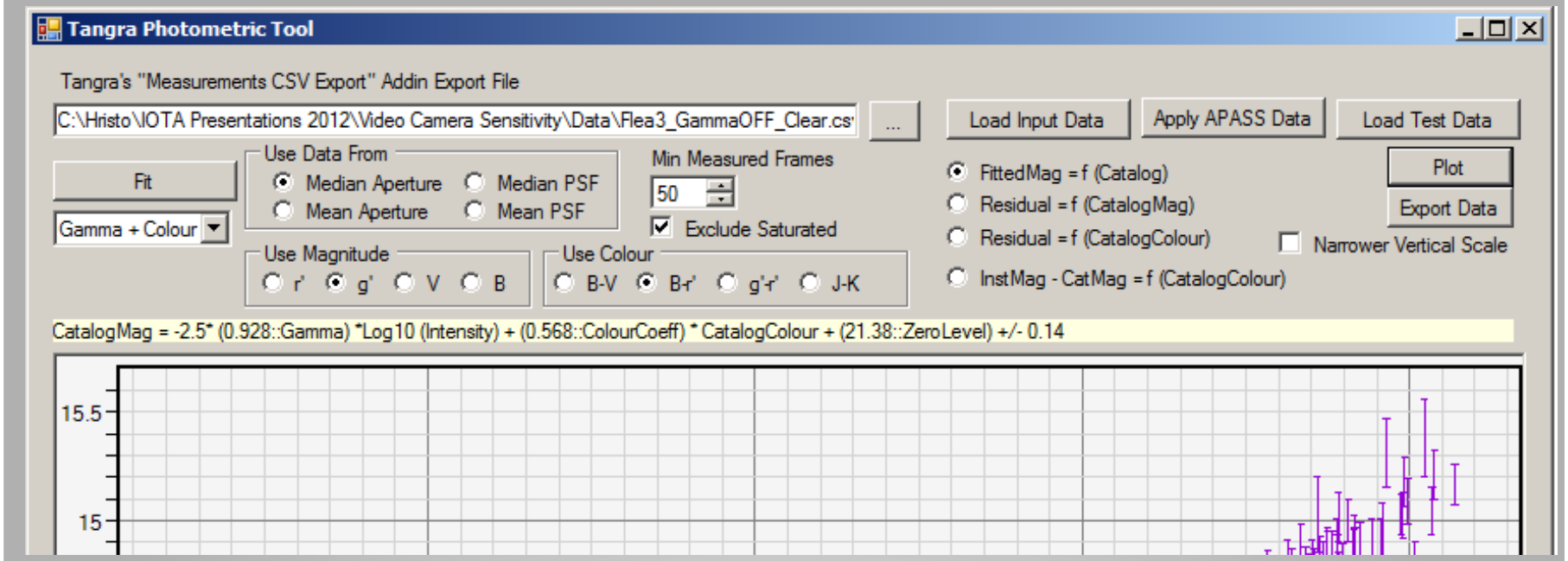
Date	Camera	Start UT	End UT	Filter	Zenith Angle	AtmExt Max Δm
03 Sep	WAT120N	11:10	11:24	Clear	21°-24°	0.01^{m}
21 Sep	Flea3	10:53	11:07	r'	31°-34°	0.01^{m}
21 Sep	Flea3	11:09	11:20	r’	35°-37°	0.01^{m}
21 Sep	Flea3	11:37	11:48	Clear	40°-43°	0.02^{m}
04 Oct	WAT120N	10:59	11:14	Clear	43°-46°	0.02^{m}
04 Oct	WAT902H	11:20	11:32	Clear	47°-50°	0.02^{m}
04 Oct	PC164EX2	11:39	11:45	Clear	50°-53°	0.02^{m}

Observing Sessions

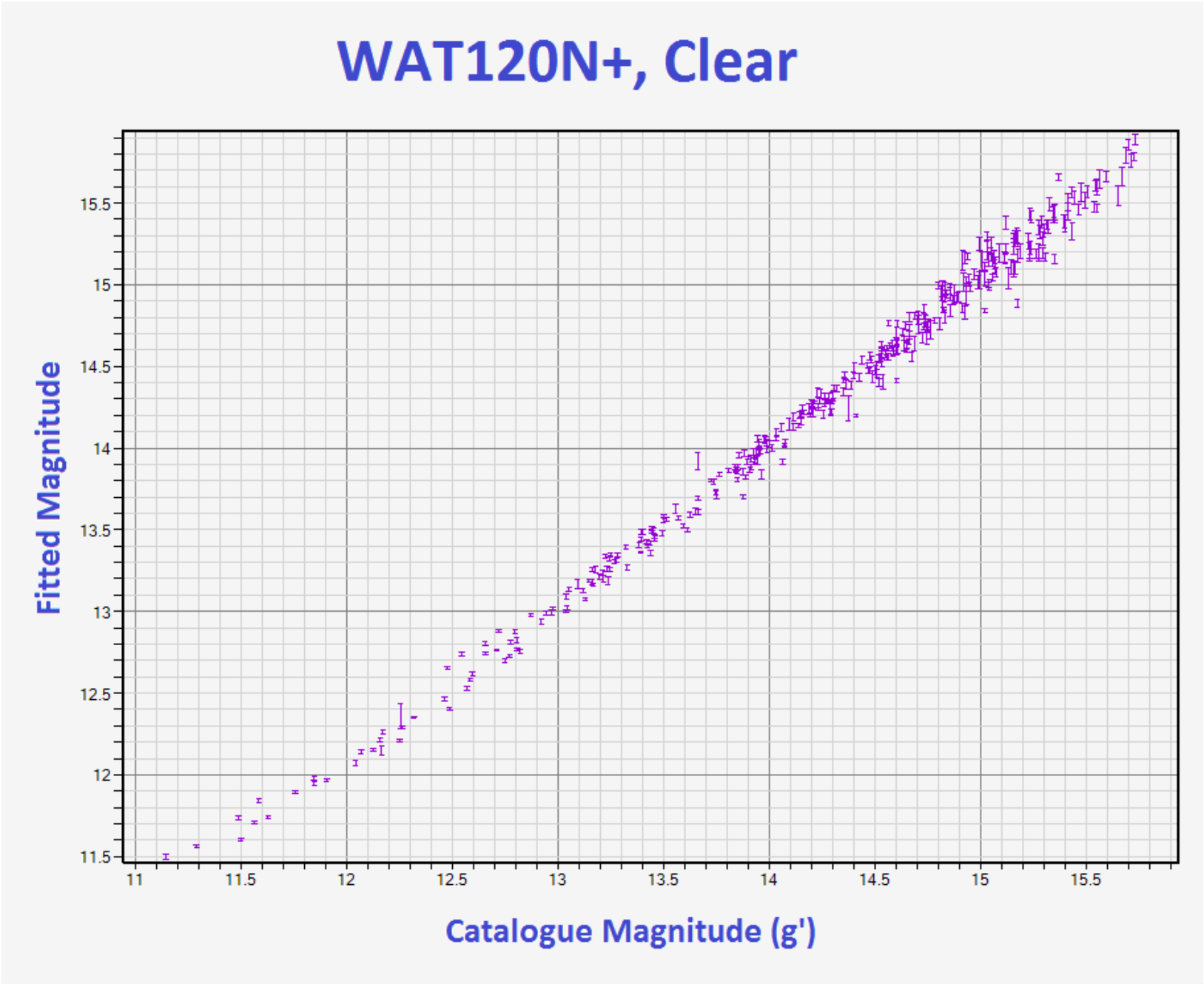


Data Reduction

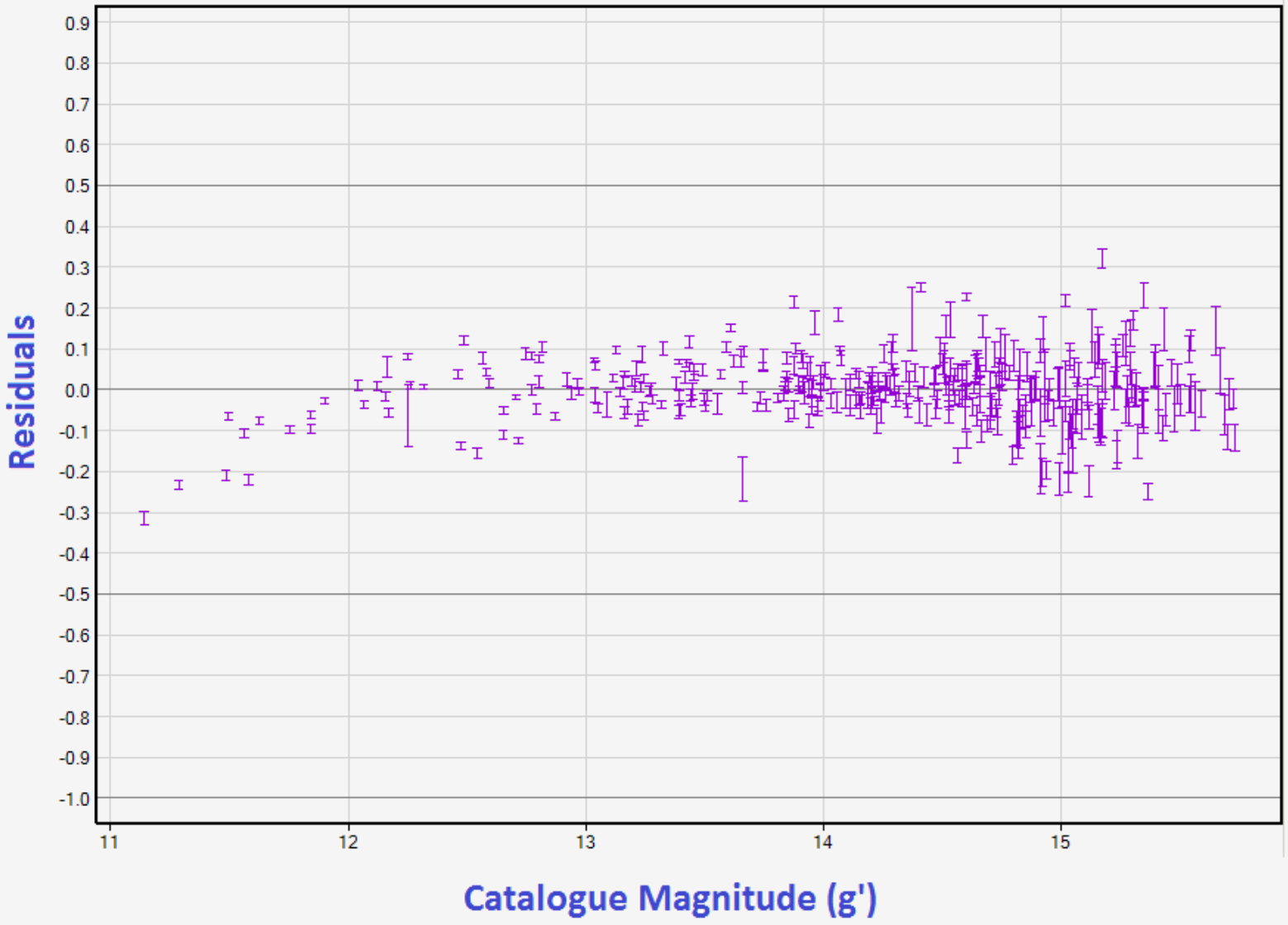
$$Mag = -2.5 * NonLinerCoeff * Log10(I) + ColourCoeff * CatalogColour + ZeroPoint$$



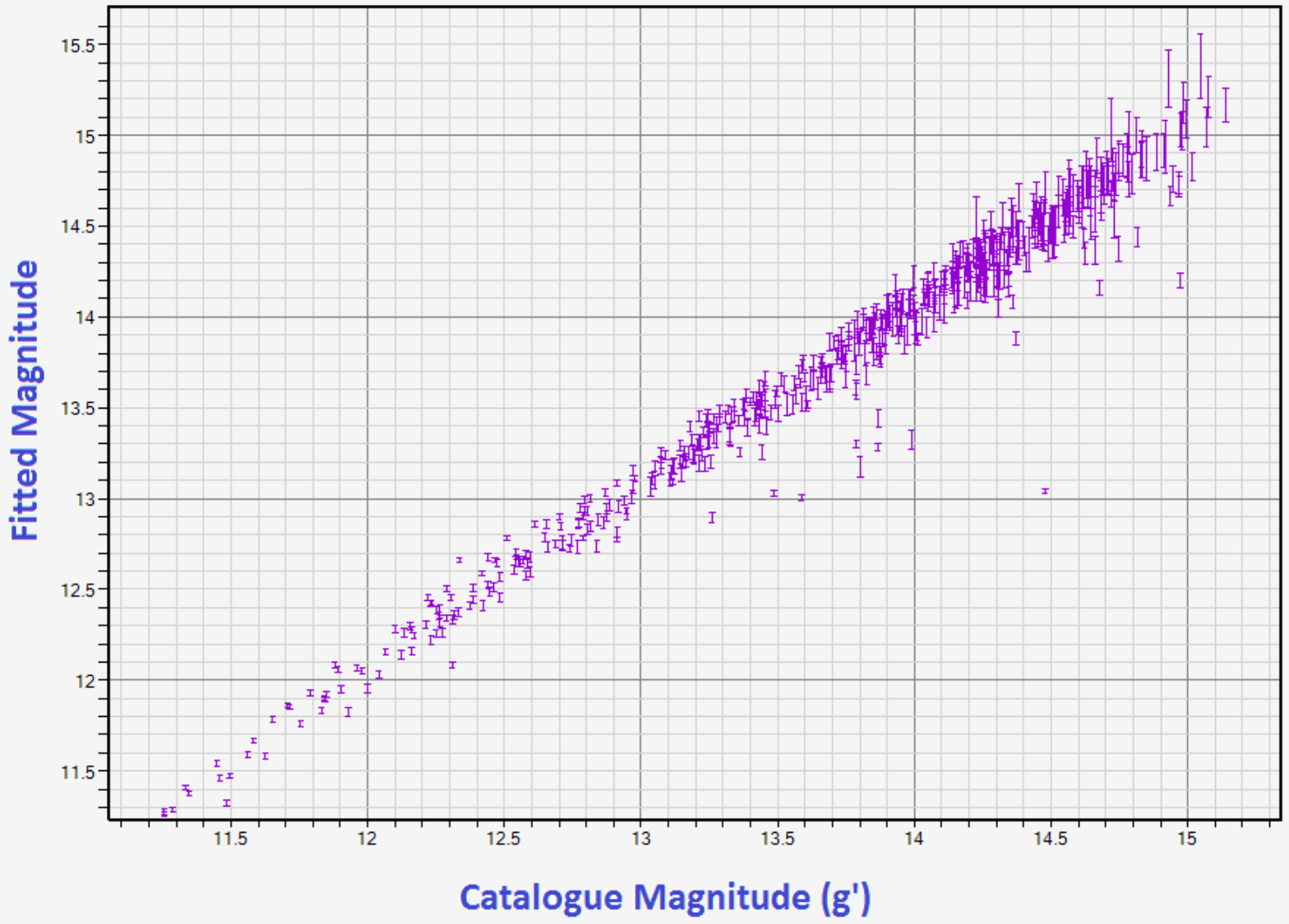
Magnitude and Colour Fitting


WAT120N+, Clear
Fitted Magnitude
Catalogue Magnitude (g')
11
11.5
12
12.5
13
13.5
14
14.5
15
15.5

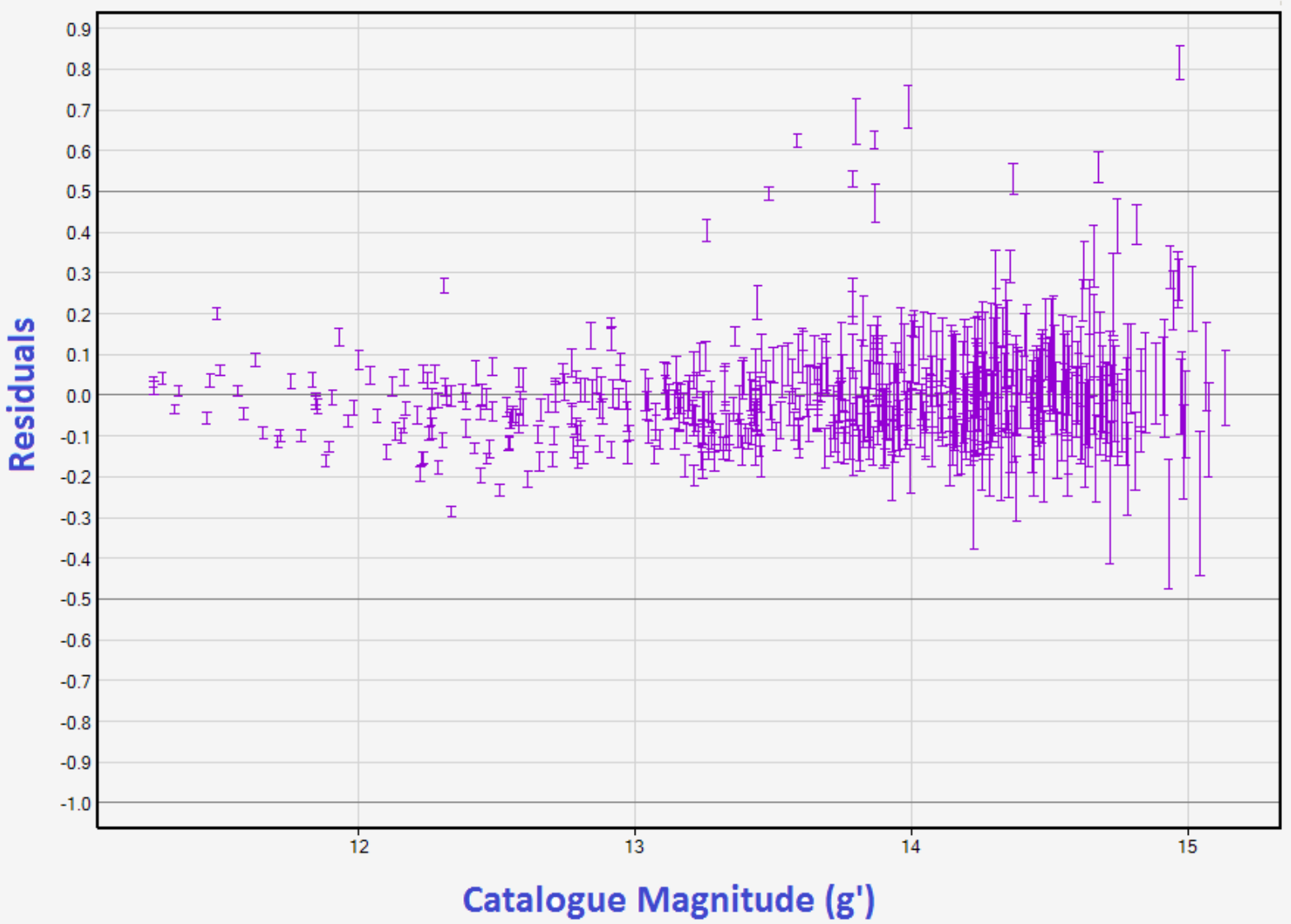
WAT120N+, Clear

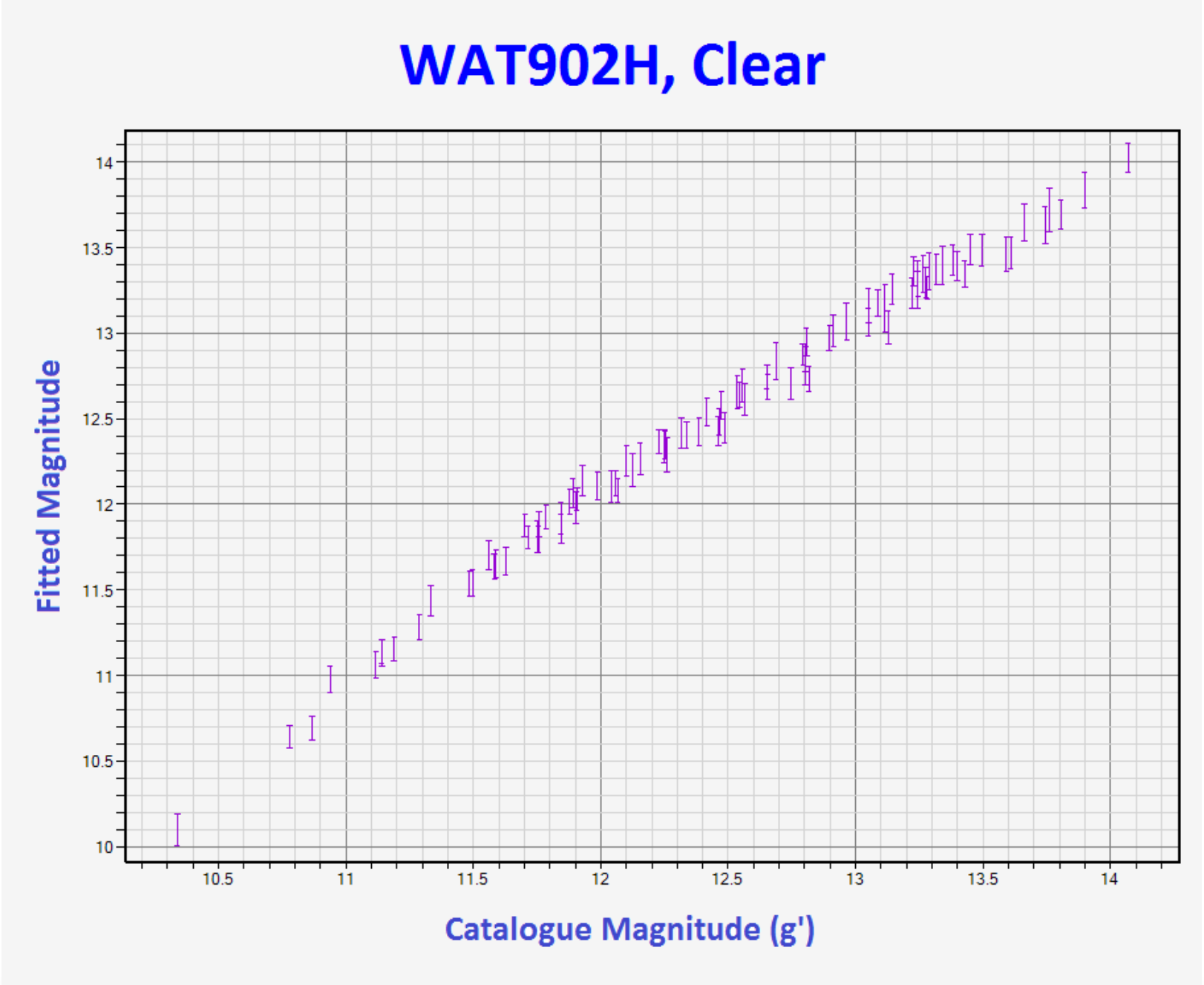


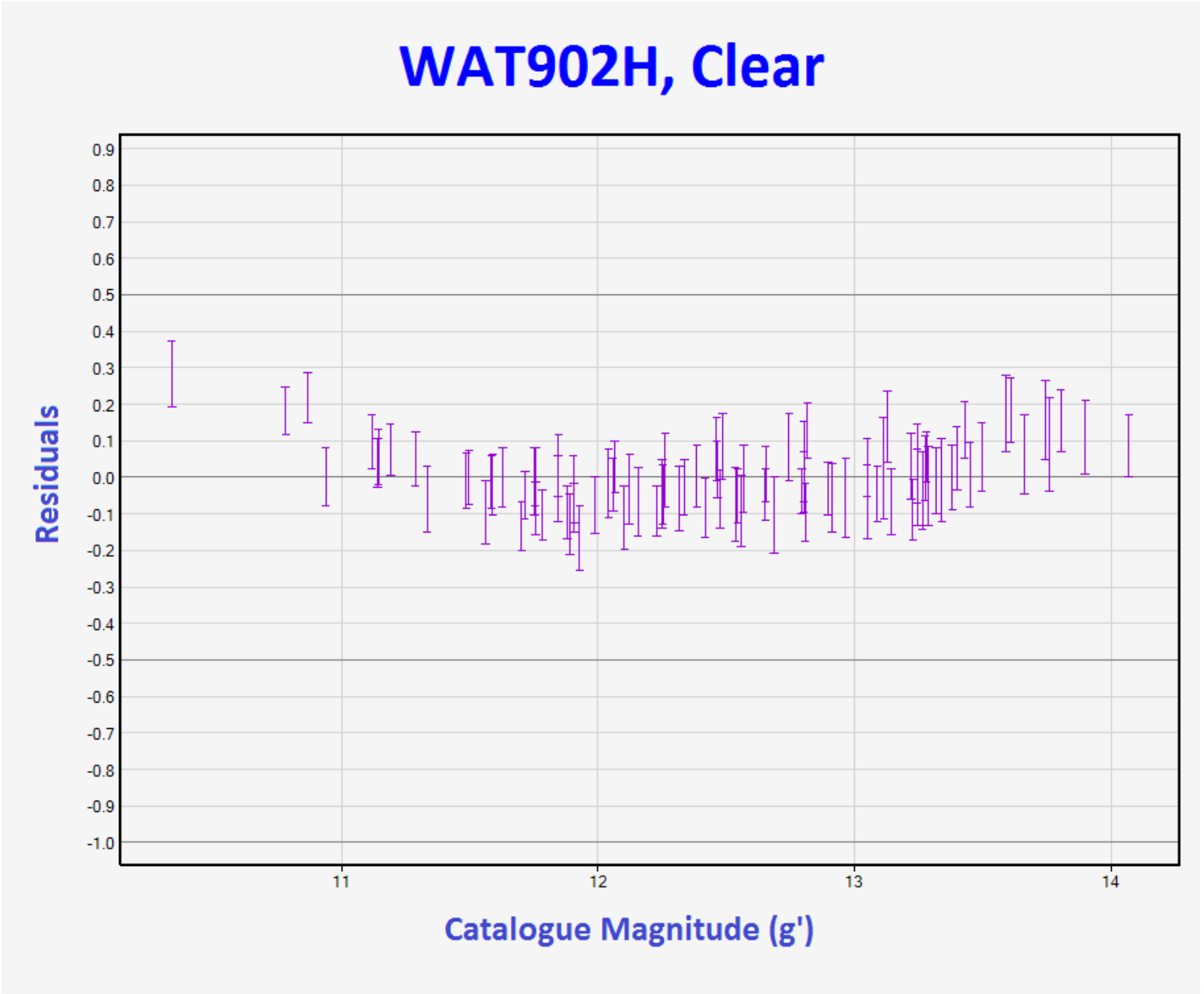
Flea3, Clear


Fitted Magnitude
15.5
15
14.5
14
13.5
13
12.5
12
11.5
11.5
12
12.5
13
13.5
14
14.5
15
Catalogue Magnitude (g')

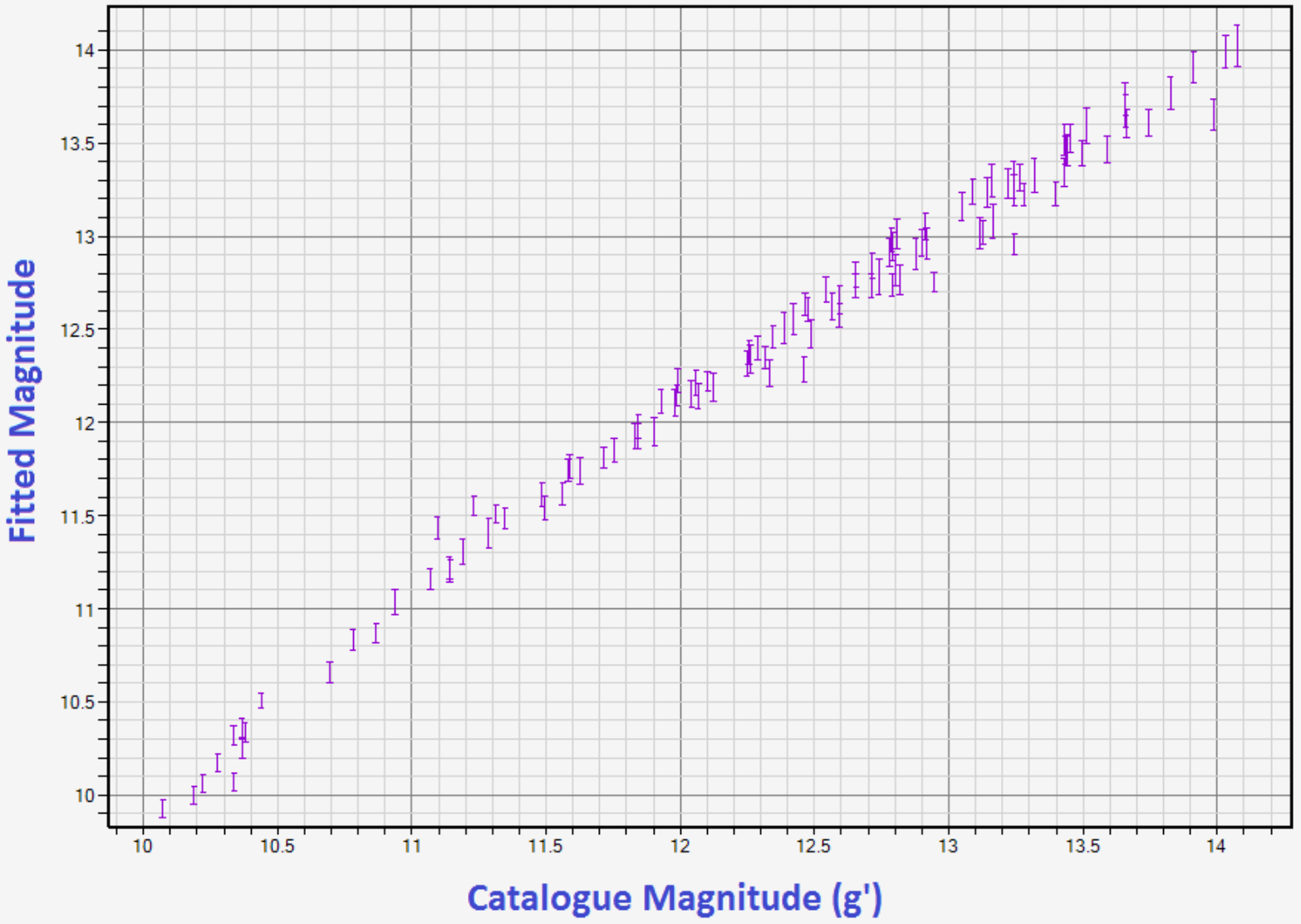
Flea3, Clear


Residuals
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
12
13
14
15
Catalogue Magnitude (g')

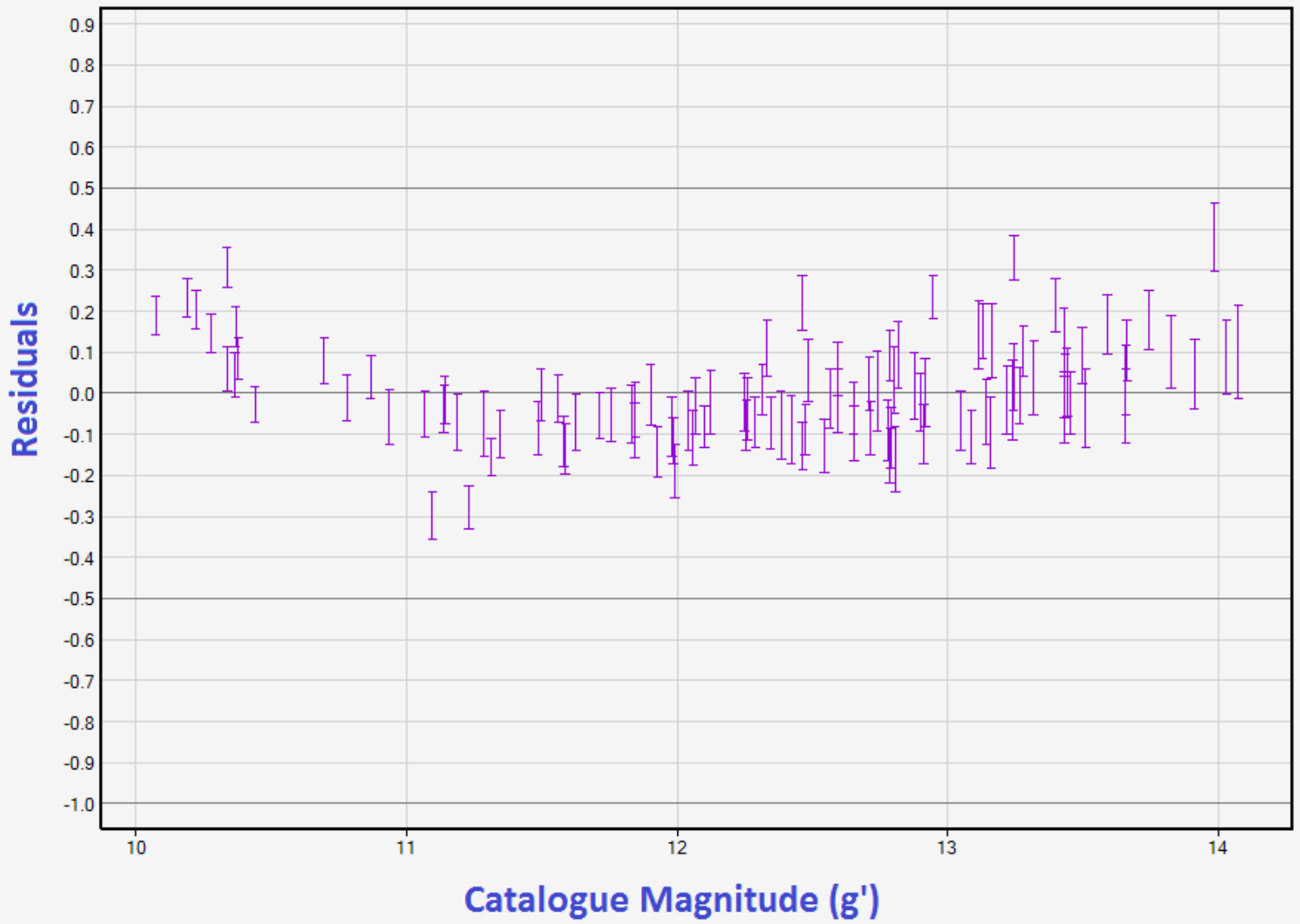

WAT902H, Clear
Fitted Magnitude
Catalogue Magnitude (g')
14
13.5
13
12.5
12
11.5
11
10.5
10
10.5
11
11.5
12
12.5
13
13.5
14


WAT902H, Clear
Residuals
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
11
12
13
14
Catalogue Magnitude (g')

PC164-EX2


Fitted Magnitude
Catalogue Magnitude (g')
14
13.5
13
12.5
12
11.5
11
10.5
10
10
10.5
11
11.5
12
12.5
13
13.5
14

PC164-EX2


Residuals
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
10
11
12
13
14
Catalogue Magnitude (g')

WAT120N+ (Gamma = OFF)

g′ = -2.5*1.012*Log10 (Intensity) + 0.549 * (B-r′) + 21.36 +/- 0.08
r′ = -2.5*1.017*Log10 (Intensity) - 0.121 * (B-r′) + 21.50 +/- 0.08

WAT902H (Gamma = OFF)

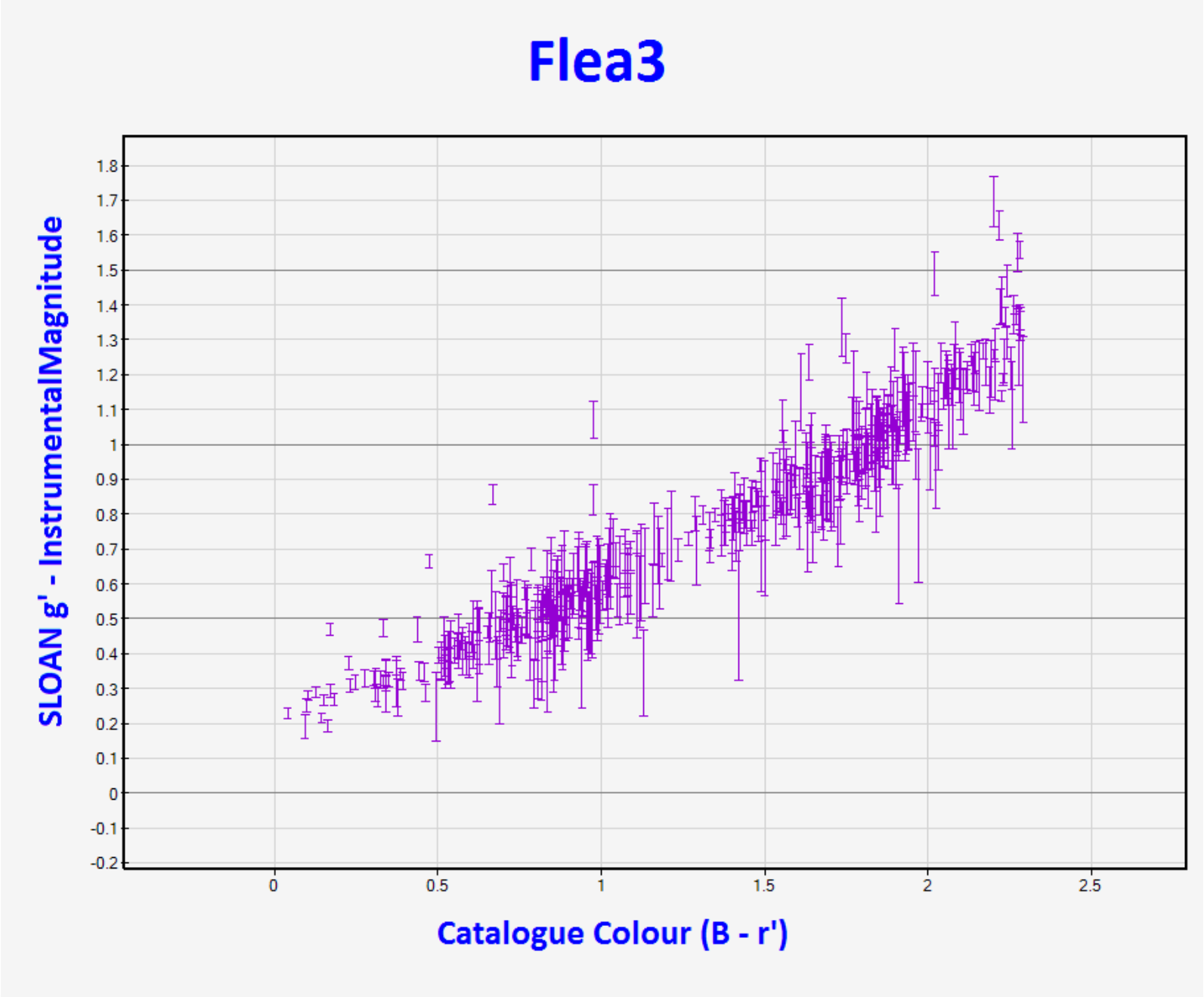
g′ = -2.5*1.183*Log10 (Intensity) + 0.596 * (B-r′) + 20.13 +/- 0.08
r′ = -2.5*1.210*Log10 (Intensity) - 0.079 * (B-r′) + 20.43 +/- 0.07

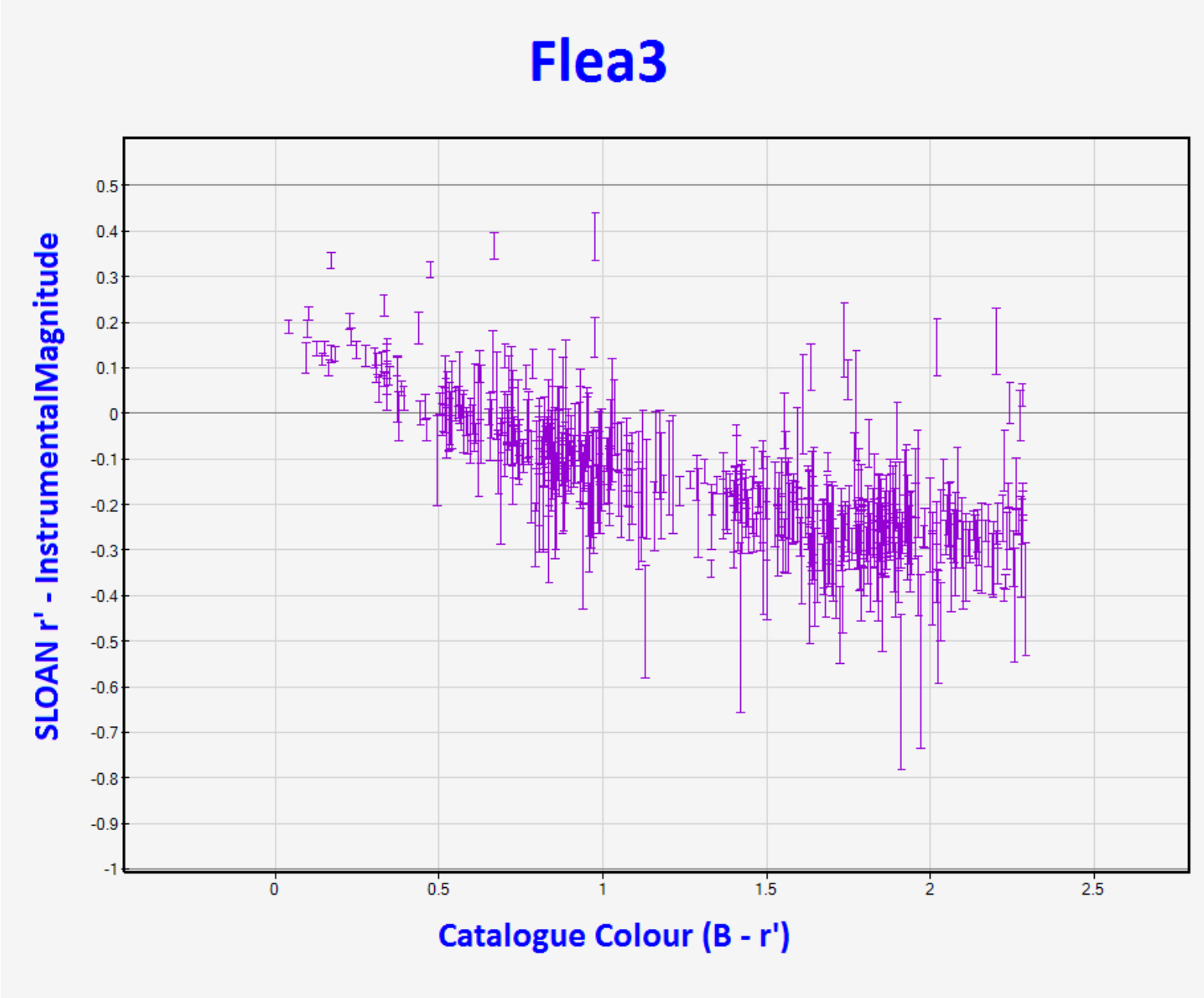
PC164EX2

g′ = -2.5*1.034*Log10 (Intensity) + 0.614 * (B-r′) + 19.47 +/- 0.12
r′ = -2.5*1.138*Log10 (Intensity) - 0.041 * (B-r′) + 20.32 +/- 0.10

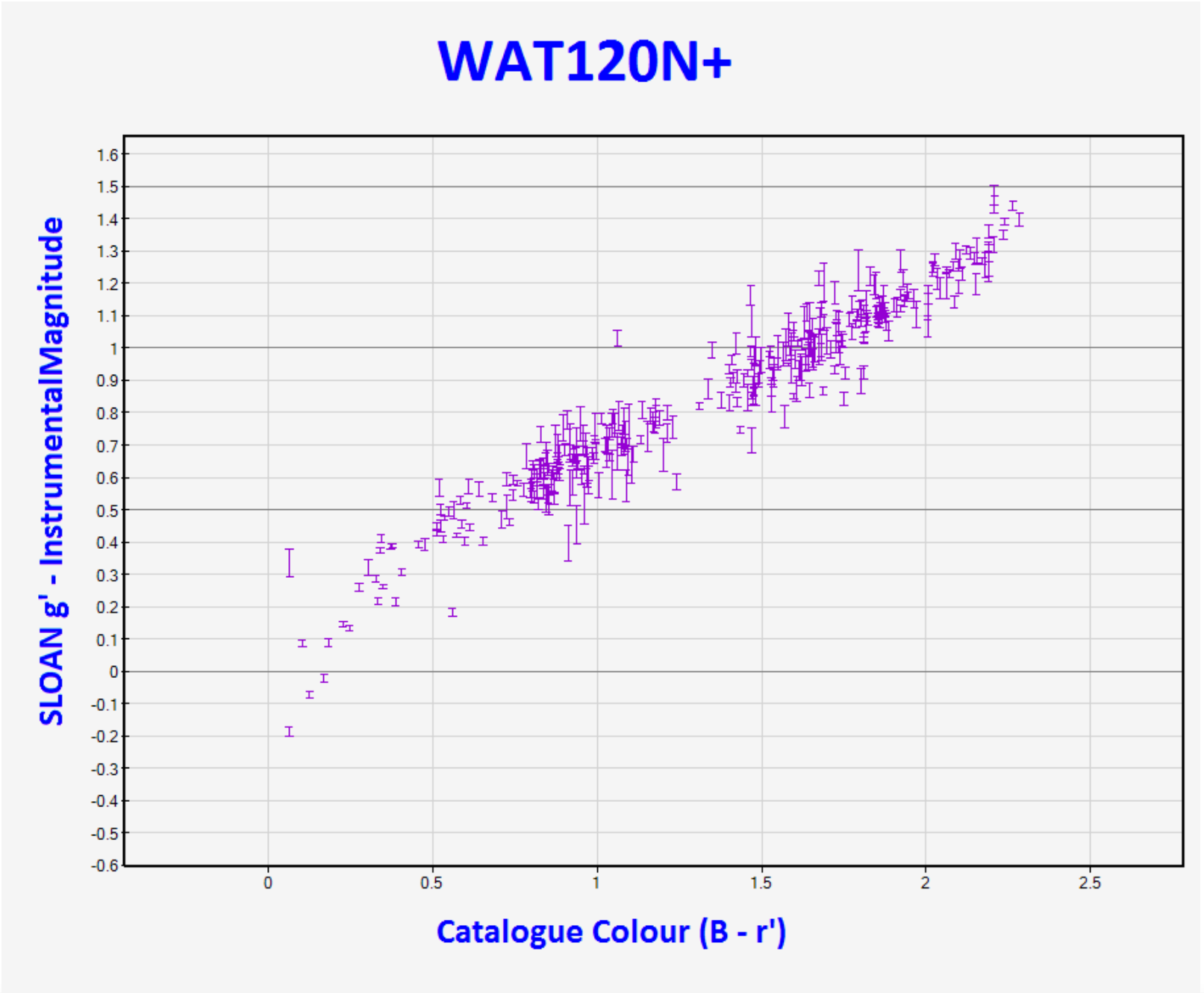
Flea3 (Gamma = OFF)

g′ = -2.5*0.928*Log10 (Intensity) + 0.568 * (B-r′) + 21.38 +/- 0.14
r′ = -2.5*0.927*Log10 (Intensity) - 0.102 * (B-r′) + 21.49 +/- 0.14

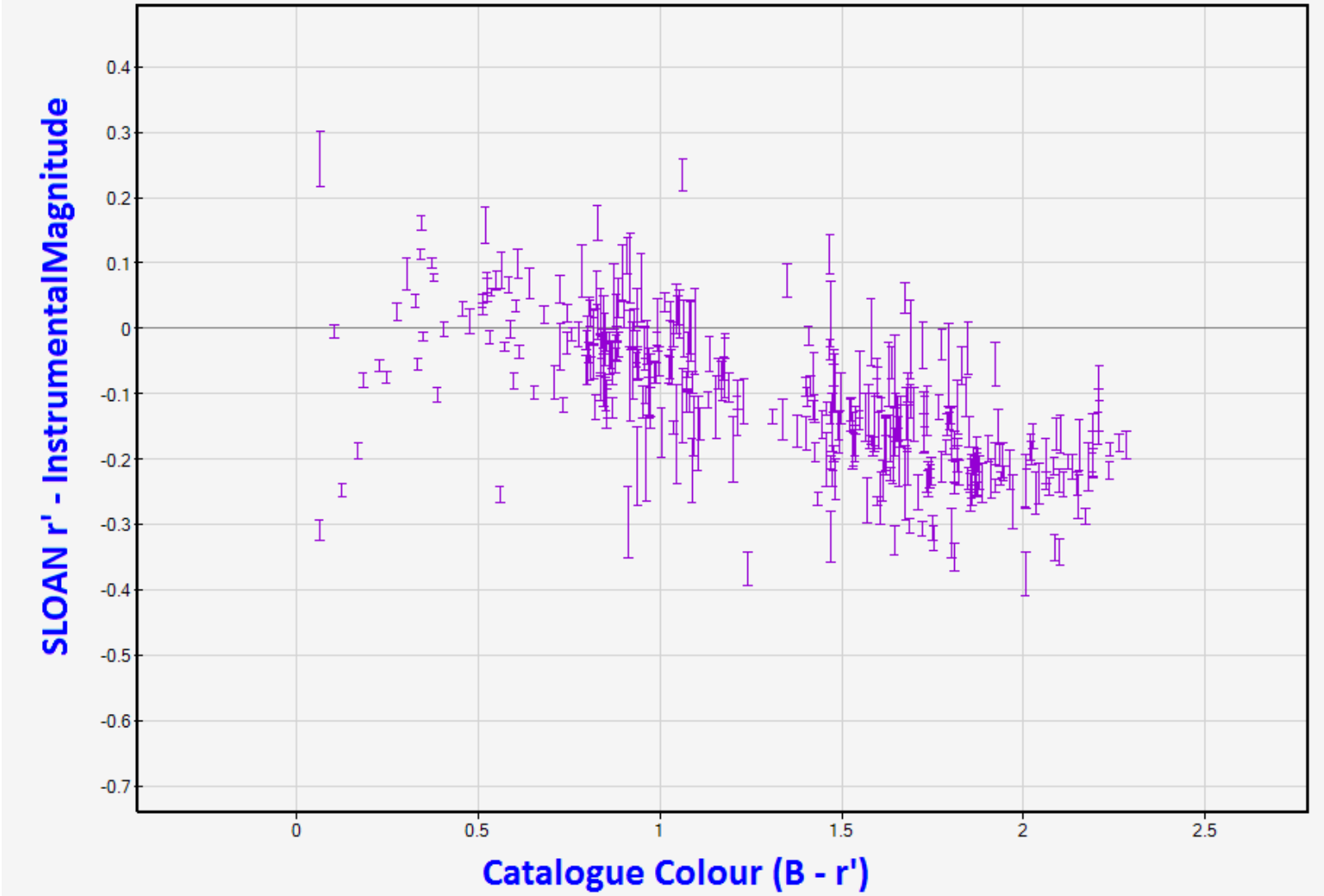

Flea3
SLOAN g' - InstrumentalMagnitude
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
0
0.5
1
1.5
2
2.5
Catalogue Colour (B - r')


Flea3
SLOAN r' - InstrumentalMagnitude
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1
0
0.5
1
1.5
2
2.5
Catalogue Colour (B - r')

WAT120N+


SLOAN g' - InstrumentalMagnitude
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
0
0.5
1
1.5
2
2.5
Catalogue Colour (B - r')

WAT120N+


SLOAN r' - InstrumentalMagnitude
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
0
0.5
1
1.5
2
2.5
Catalogue Colour (B - r')

WAT120N+

g' - InstrumentalMag = + 0.792 * (B-V) + ZeroPoint +/- 0.09
r' - InstrumentalMag = - 0.169 * (B-V) + ZeroPoint +/- 0.09
V - InstrumentalMag = +0.271 * (B-V) + ZeroPoint +/- 0.09
U3 - InstrumentalMag = - 0.085 * (B-V) + ZeroPoint +/- 0.13

WAT902H

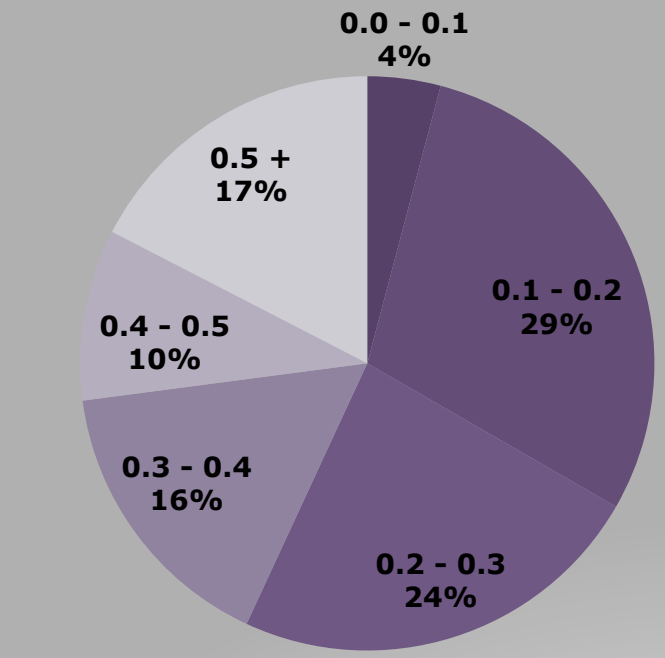
g' - InstrumentalMag = + 0.908 * (B-V) + ZeroPoint +/- 0.13
r' - InstrumentalMag = - 0.068 * (B-V) + ZeroPoint +/- 0.12
V - InstrumentalMag = +0.387 * (B-V) + ZeroPoint +/- 0.14
U3 - InstrumentalMag = + 0.021 * (B-V) + ZeroPoint +/- 0.19

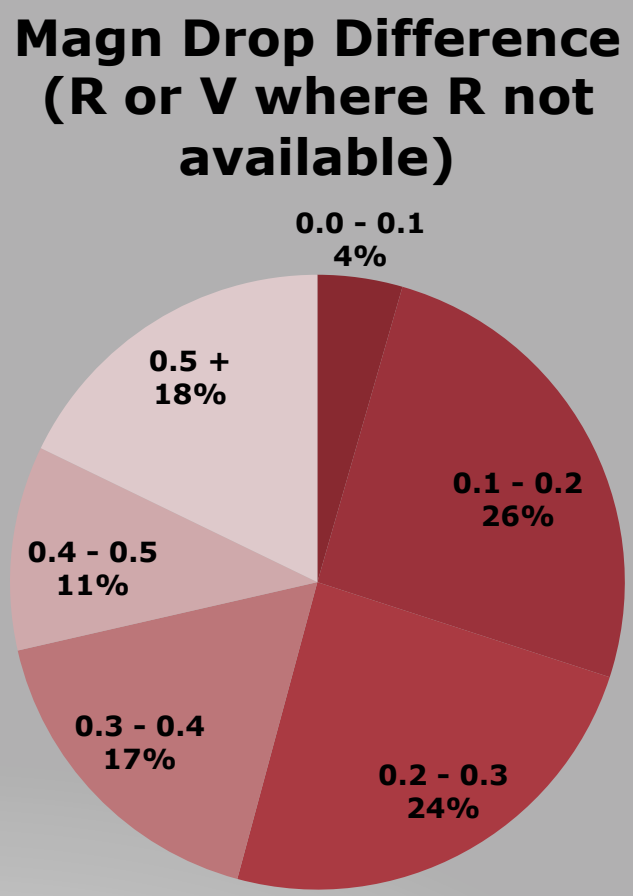
PC164EX2

g' - InstrumentalMag = + 0.901 * (B-V) + ZeroPoint +/- 0.12
r' - InstrumentalMag = - 0.003 * (B-V) + ZeroPoint +/- 0.13
V - InstrumentalMag = +0.443 * (B-V) + ZeroPoint +/- 0.14
U3 - InstrumentalMag = + 0.105 * (B-V) + ZeroPoint +/- 0.21

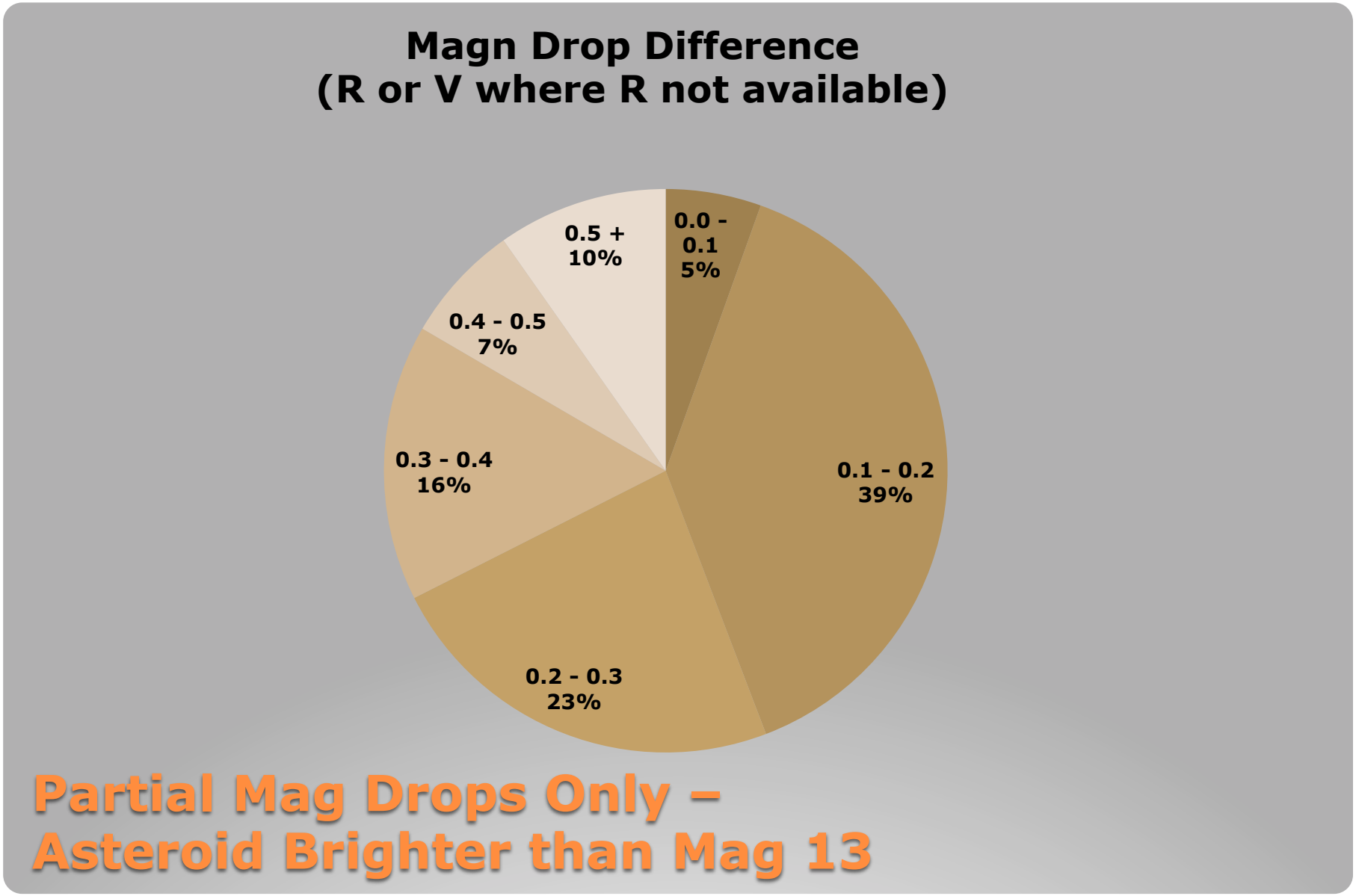
Flea3 (ICX414) (for B-V < 1.7)

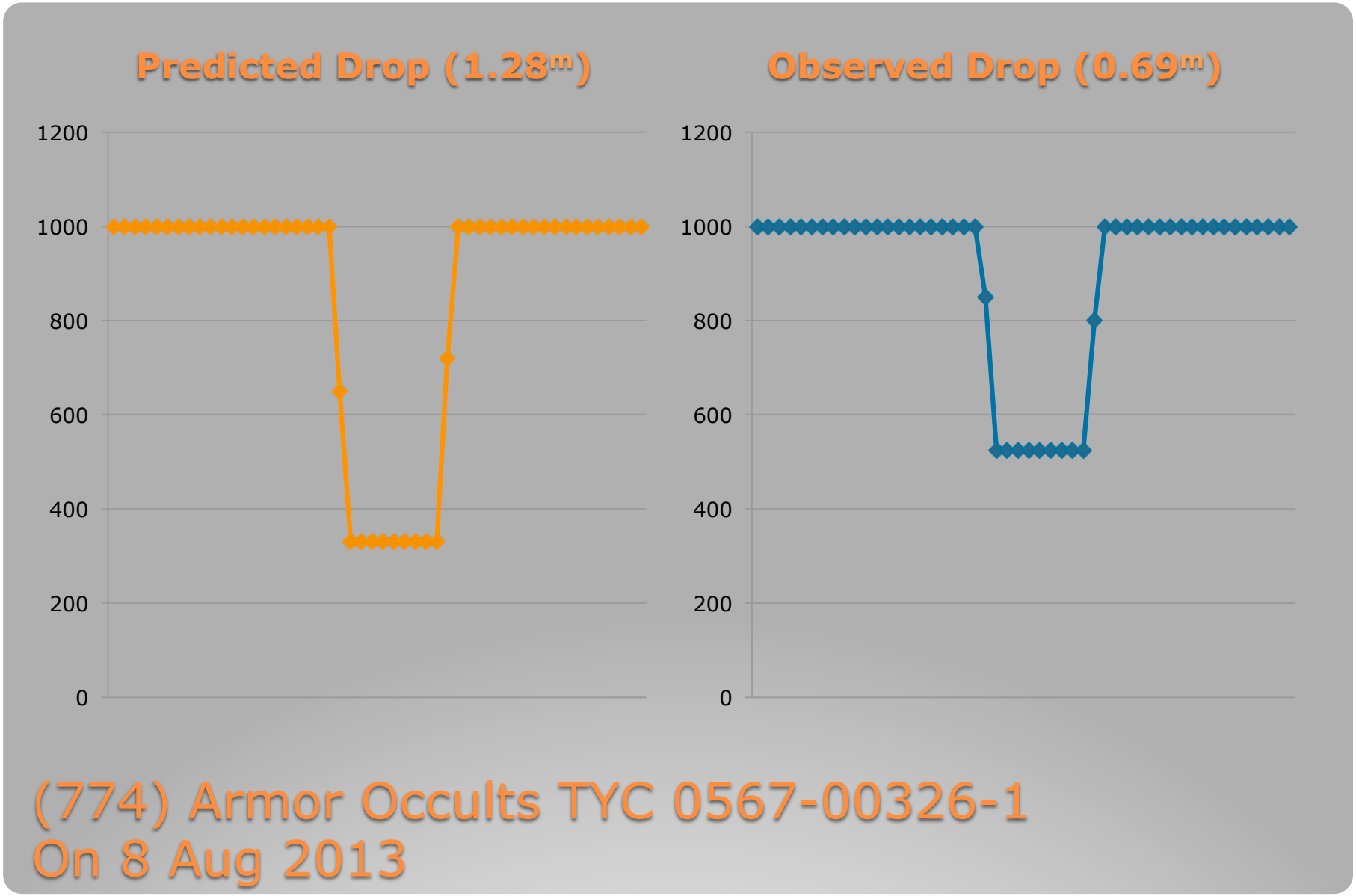
g' - InstrumentalMag = + 0.715 * (B-V) + ZeroPoint +/- 0.10
r' - InstrumentalMag = - 0.256 * (B-V) + ZeroPoint +/- 0.10
V - InstrumentalMag = +0.188 * (B-V) + ZeroPoint +/- 0.10
U3 - InstrumentalMag = - 0.156 * (B-V) + ZeroPoint +/- 0.13





Steve Preston Events 2012-13


Magn Drop Difference
(R or V where R not available)
0.0 - 0.1 5%
0.1 - 0.2 39%
0.2 - 0.3 23%
0.3 - 0.4 16%
0.4 - 0.5 7%
0.5 + 10%
Partial Mag Drops Only –
Asteroid Brighter than Mag 13



(774) Armor Occults TYC 0567-00326-1
On 8 Aug 2013

(1) Ceres Occults TYC 1251-00358-1 On 04 Jun 2012

Conclusions

- Camera instrumental magnitudes can be quite different than predicted V and R magnitudes
- To match camera measured magnitudes to V or R calibration is required
- Transformation colour coefficients can be determined experimentally for your camera and used to convert standard magnitudes to instrumental magnitudes and vice versa

QUESTIONS?

http://www.hristopavlov.net/videocameras