Possible Targets for Automated Speckle Observing:

Known Doubles

The Big Question

Speckle observing is very efficient (and soon to be even more so!) – are there enough suitable targets to make automation worthwhile?

Well, duh!

WDS Database

- Currently 128,849 pairs (all-sky, all mags, all separations)

- Assuming generous speckle limits:
  - Separation 30 mas (4m limit) to 3″ (isoplanicity)
  - $V_1<14$, $V_2<14$, $\Delta m<5$ mags, no IR pairs
  - all-sky

- ~41,500 known pairs appropriate to speckle

Speckle "Sweet Spots"

For all lists will also give numbers of targets within "optimum separation regimes"

- for 4m-class telescope: 50 mas to 0.5″
- for 2m-class telescope: 100 mas to 1″
- for 26in telescope: 300 mas to 3″

For all WDS:

- 4m: 12,264 pairs
- 2m: 23,663 pairs
- 26in: 36,068 pairs

Hipparcos Double Stars (HDS)

- 3,383 pairs, separations > 0.1″, mags 7 - 11
- 100 determined to be bogus
- 1,810 (54%) of pairs within speckle regime remain unconfirmed (or only “confirmed” by Tycho)

Within sweet spots:

- 4m: 1,309
- 2m: 1,624
- 26in: 926

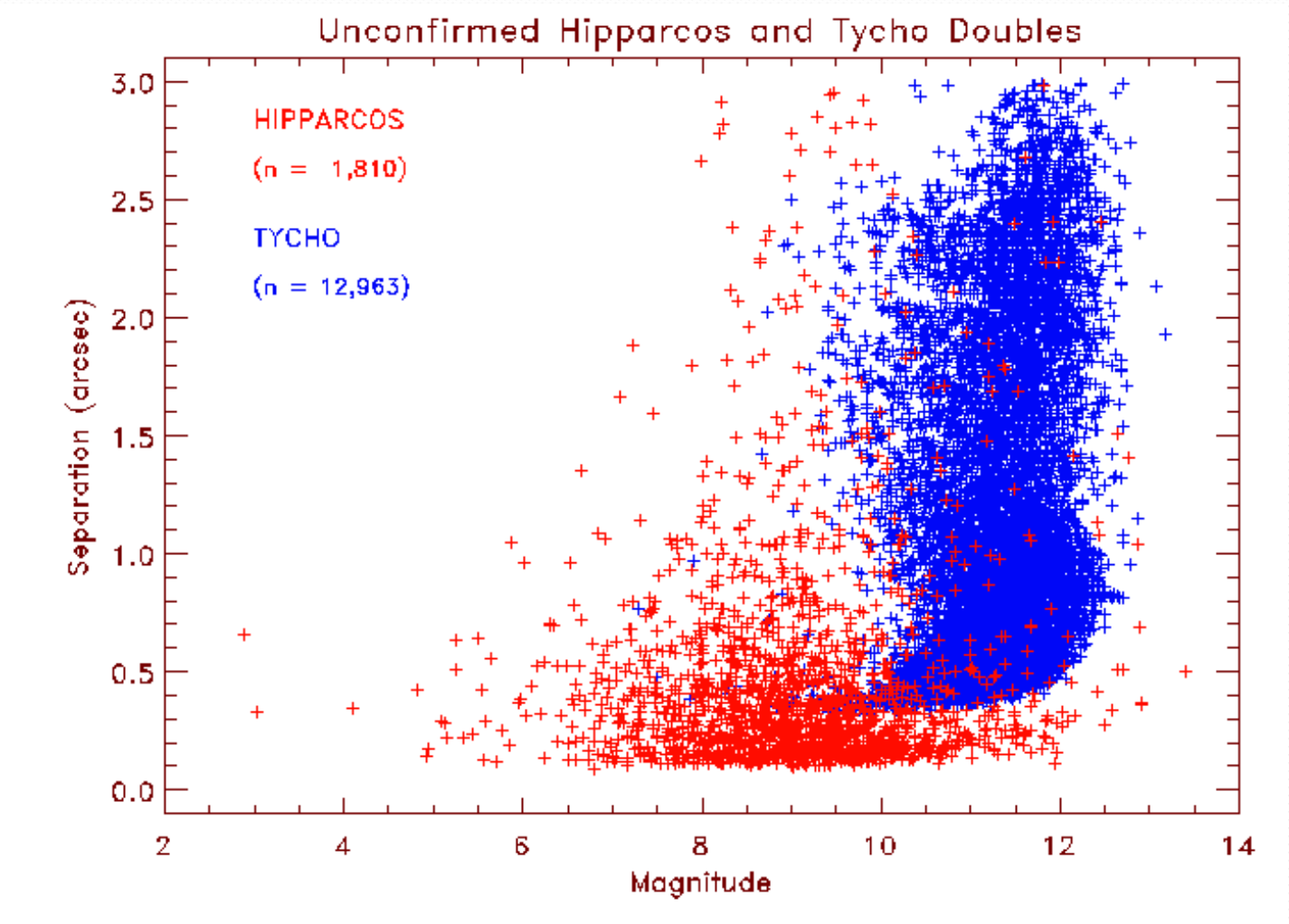
Tycho Double Stars (TDS, TDT)

- 14,188 pairs, separations > 0.3″, mags 10 – 12.5
- 190 determined to be bogus
- 12,963 (91%) of pairs within speckle regime remain unconfirmed!

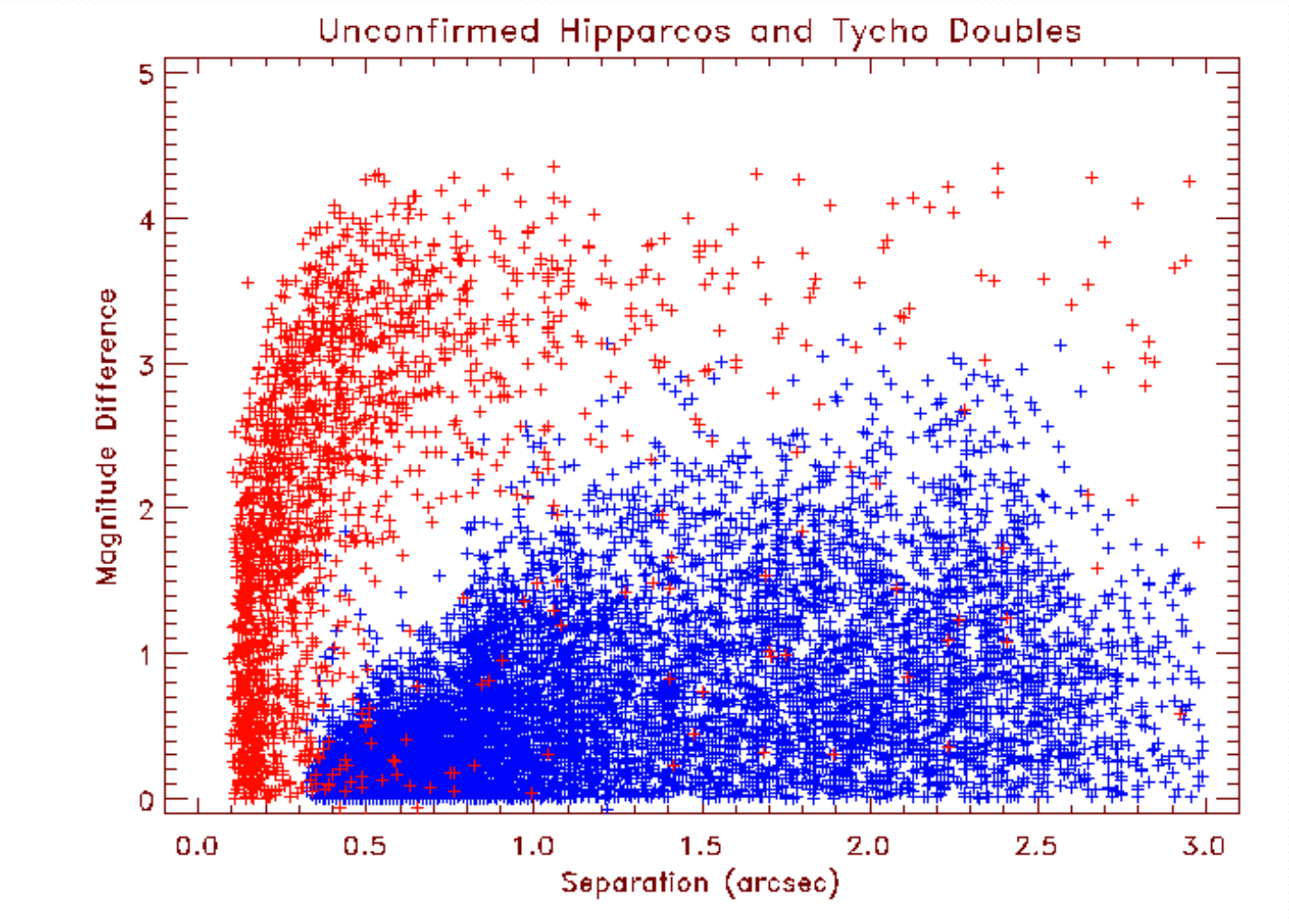
Within sweet spots:

- 4m: 2,816
- 2m: 8,701
- 26in: 12,963

HDS and TDS Pairs



HDS and TDS Pairs



Unconfirmed High Resolution Pairs

Some 1,089 other pairs discovered by high angular resolution techniques remain unconfirmed (total / 4m / 2m / 26in):

Adaptive Optics: 41 / 25 / 33 / 25

Occultations: 748 / 696 / 605 / 50

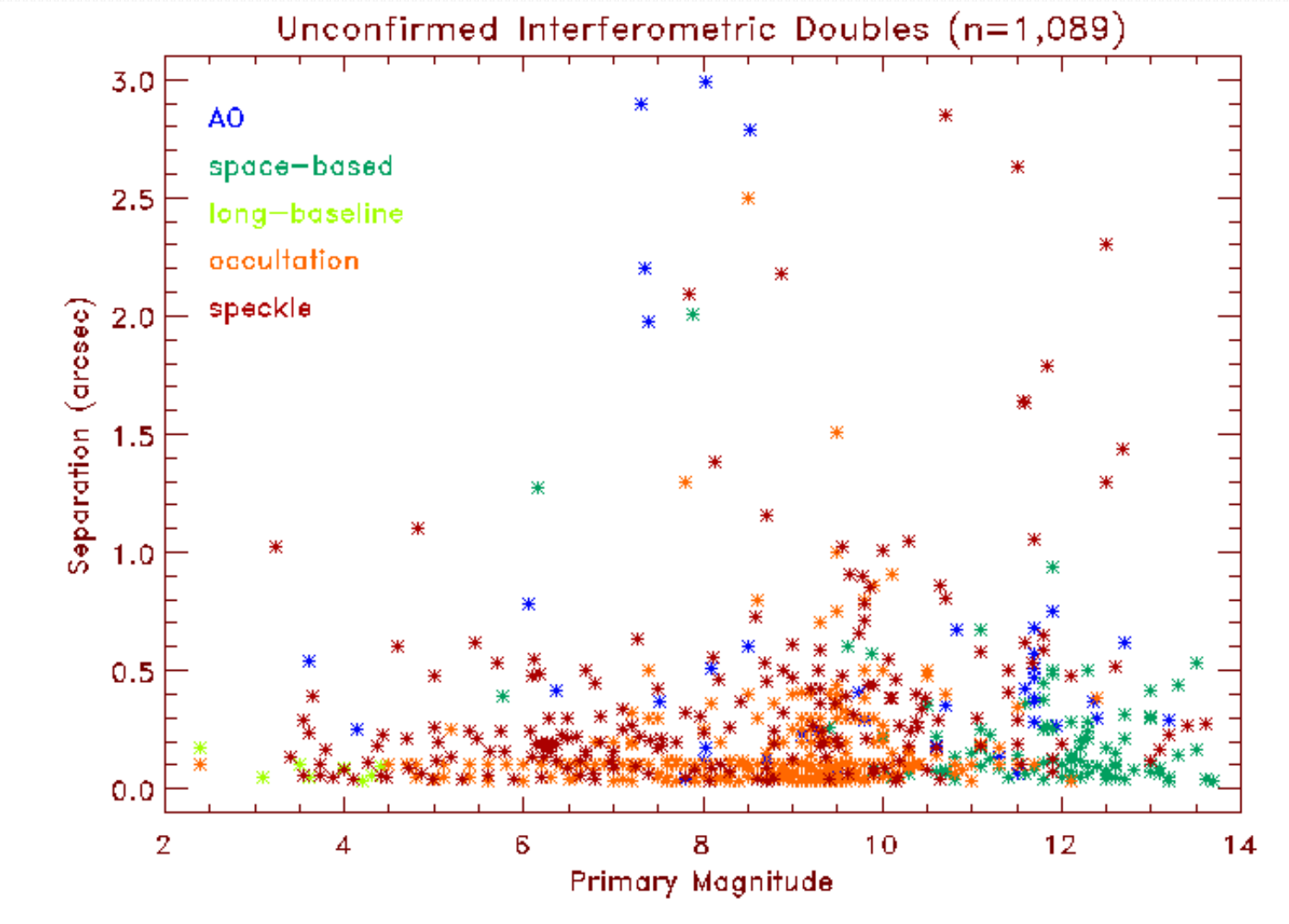
Space-based discoveries: 90 / 71 / 53 / 20

Long-baseline discoveries: 8 / 7 / 2 / 0

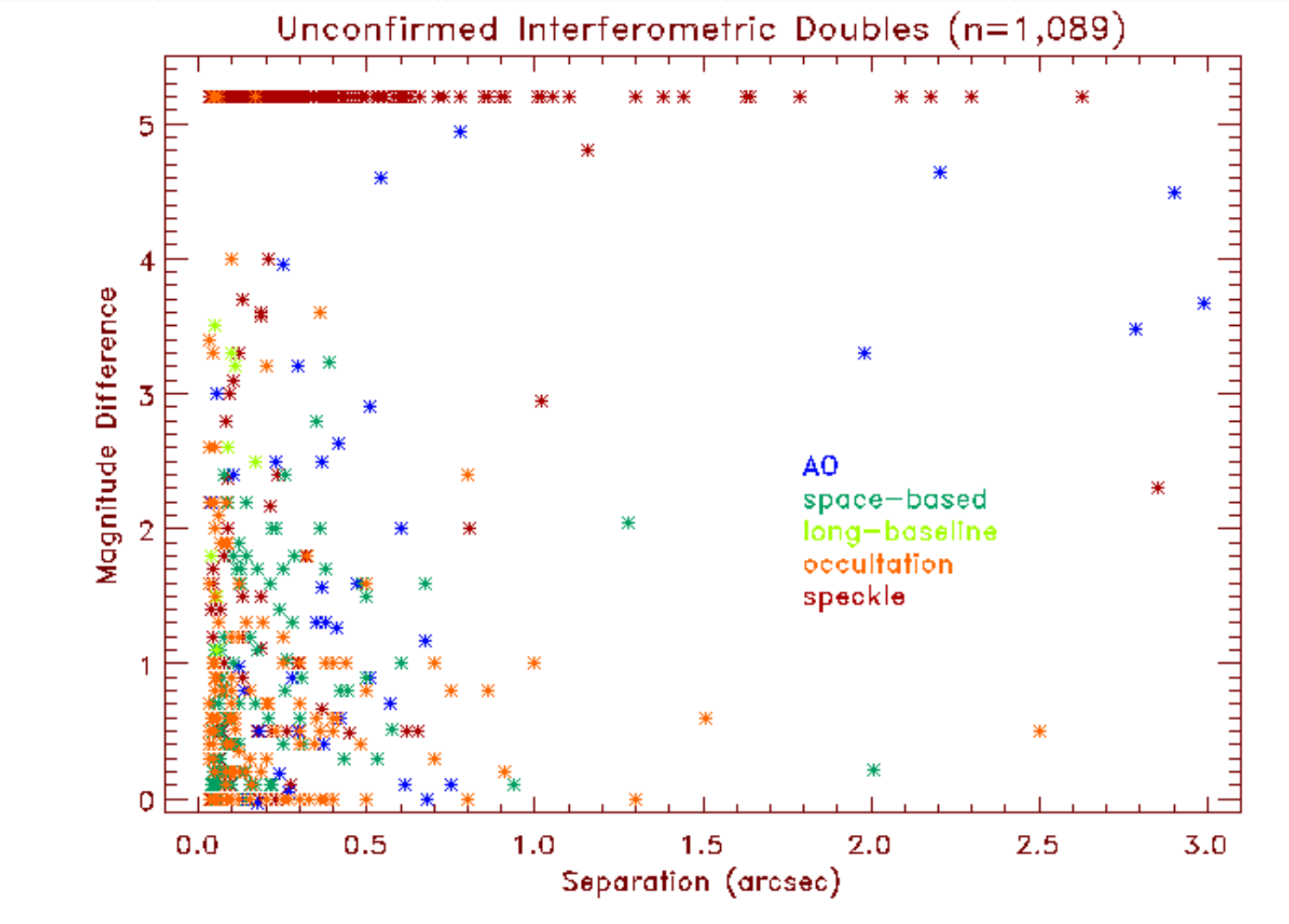
Speckle pairs: 202 / 141 / 144 / 79

All pairs: 1089 / 939 / 837 / 174

Unconfirmed Interferometric Pairs



Unconfirmed Interferometric Pairs



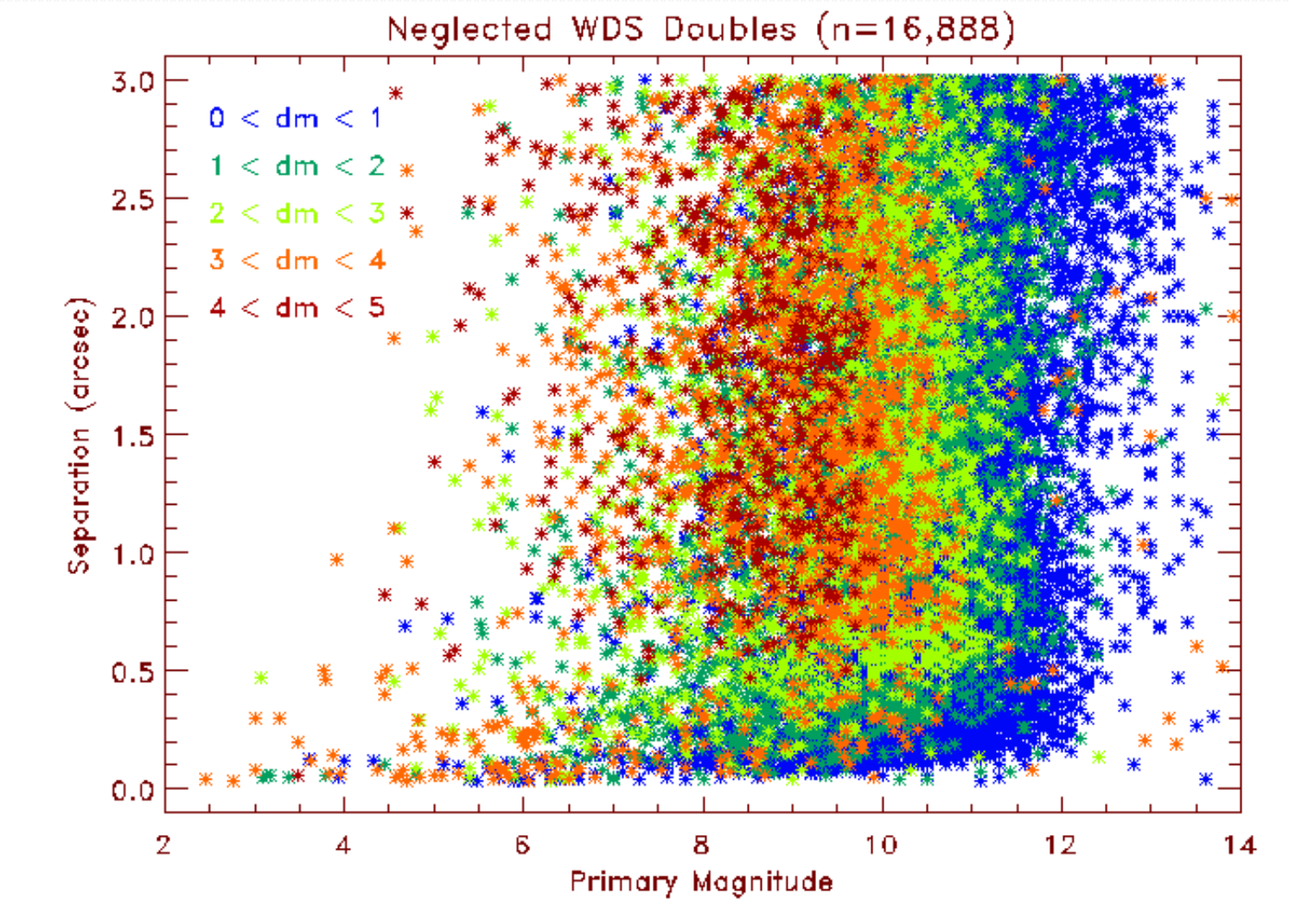
Neglected Double Stars

Many WDS pairs are “neglected” - i.e., not observed in at least 10 years. (This is in addition to unconfirmed pairs described earlier)

As of today:

- 16,888 neglected pairs within speckle regime
- 3,895 within 4m sweet spot
- 7,349 within 2m sweet spot
- 14,960 within 26in sweet spot

Neglected Double Stars



Distribution by declination

4m	HDS	TDS	HiRes	Negl	Total
0 to +90	403	1288	589	1,371	3,651
-30 to +30	452	949	826	1,627	3,854
-90 to 0	906	1,528	350	2,524	5,308

2m	HDS	TDS	HiRes	Negl	Total
0 to +90	510	4,138	511	2,280	7,439
-30 to +30	567	2,763	730	3,000	7,060
-90 to 0	1,114	4,563	326	5,069	11,072

26in	HDS	TDS	HiRes	Negl	Total
0 to +90	316	5,931	93	4,865	11,205
-30 to +30	325	3,936	115	6,067	10,443
-90 to 0	610	7,032	81	10,094	17,817

Photometry

Good photometry is just as important as good astrometry!

Differential V-band photometry →

improved Δm, light curves of variable components

Multi-wavelength differential photometry →

colors, spectral types, distances

Spectroscopy

Good spectroscopy is just as important as good astrometry!

Complementary spectroscopy → spectral types

Radial velocities → masses, full space velocities, additional info to determine physicality

Large undertaking (best through collaboration?)