Possible Targets for Automated Speckle Observing:

Survey Programs

Hipparcos Problem Stars

Reductions for 11,692 Hipparcos stars required "non-component double star solutions". Still unresolved: 10,838 (best observed with 4m)

G = acceleration solution (n=2,474)

O = orbit solution (n=172)

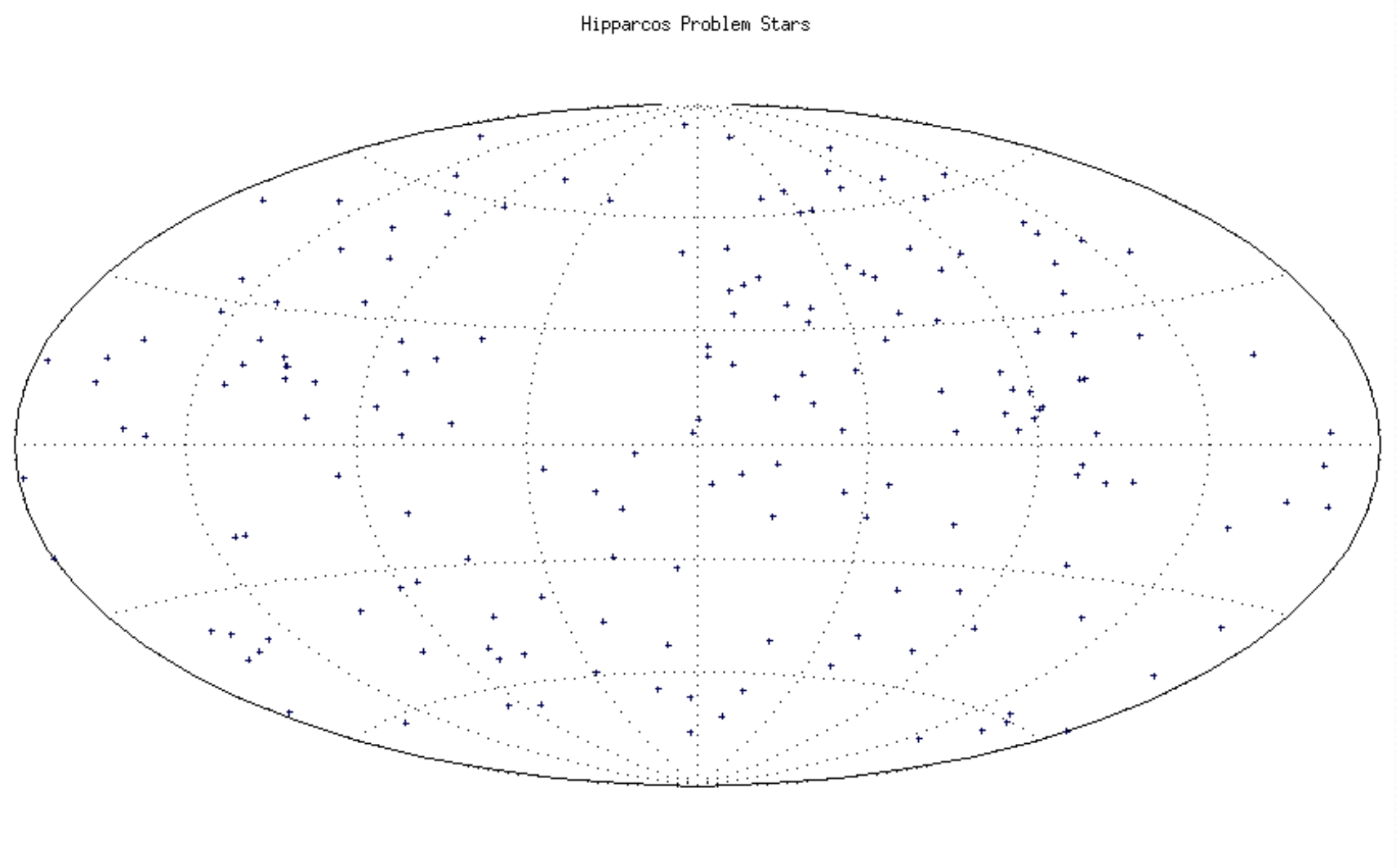
S = suspected non-single (n=7,027)*

V = variability-induced mover (n=271)

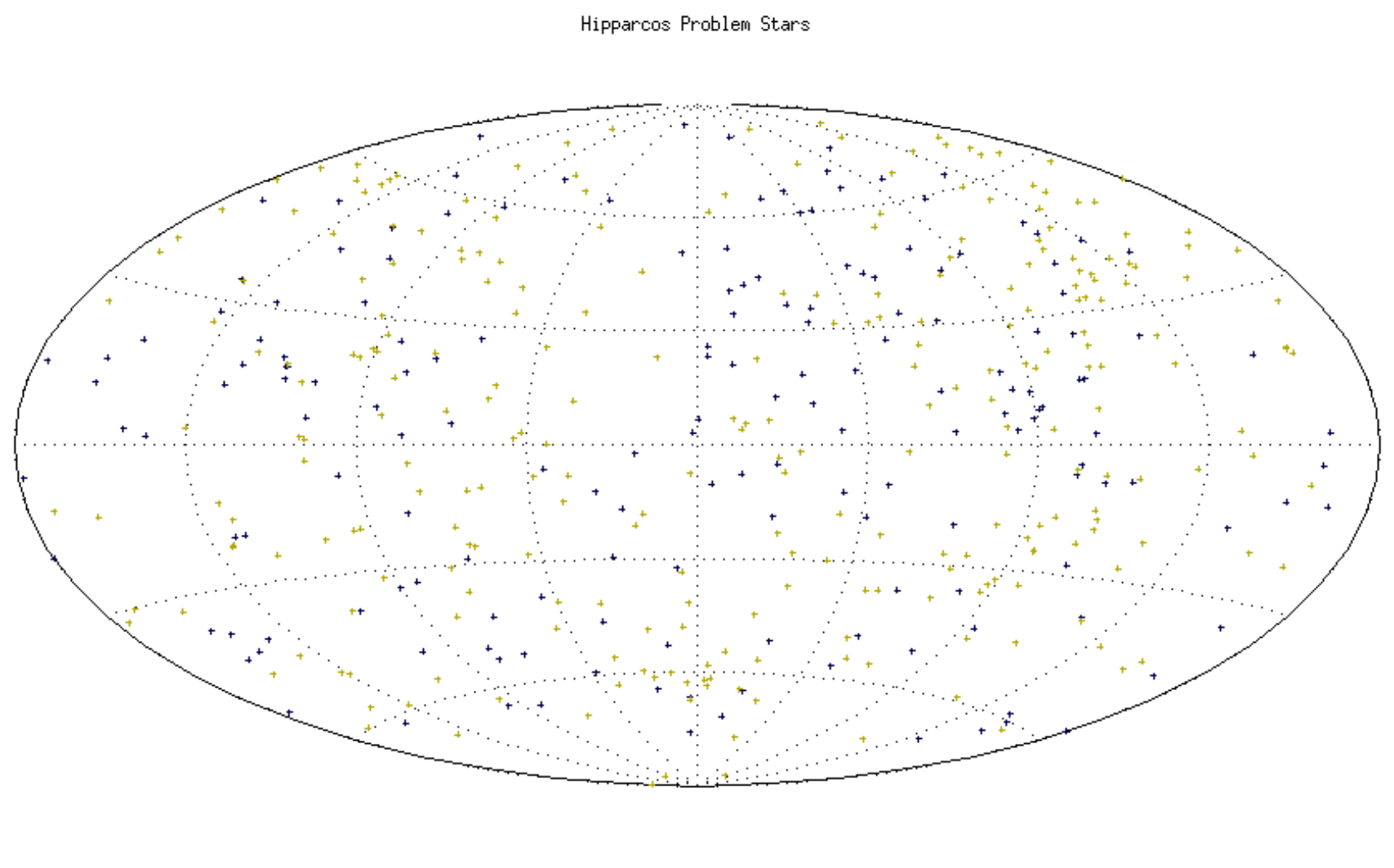
X = stochastic solution (n=1,379)*

* 563 stars have both X and S flags

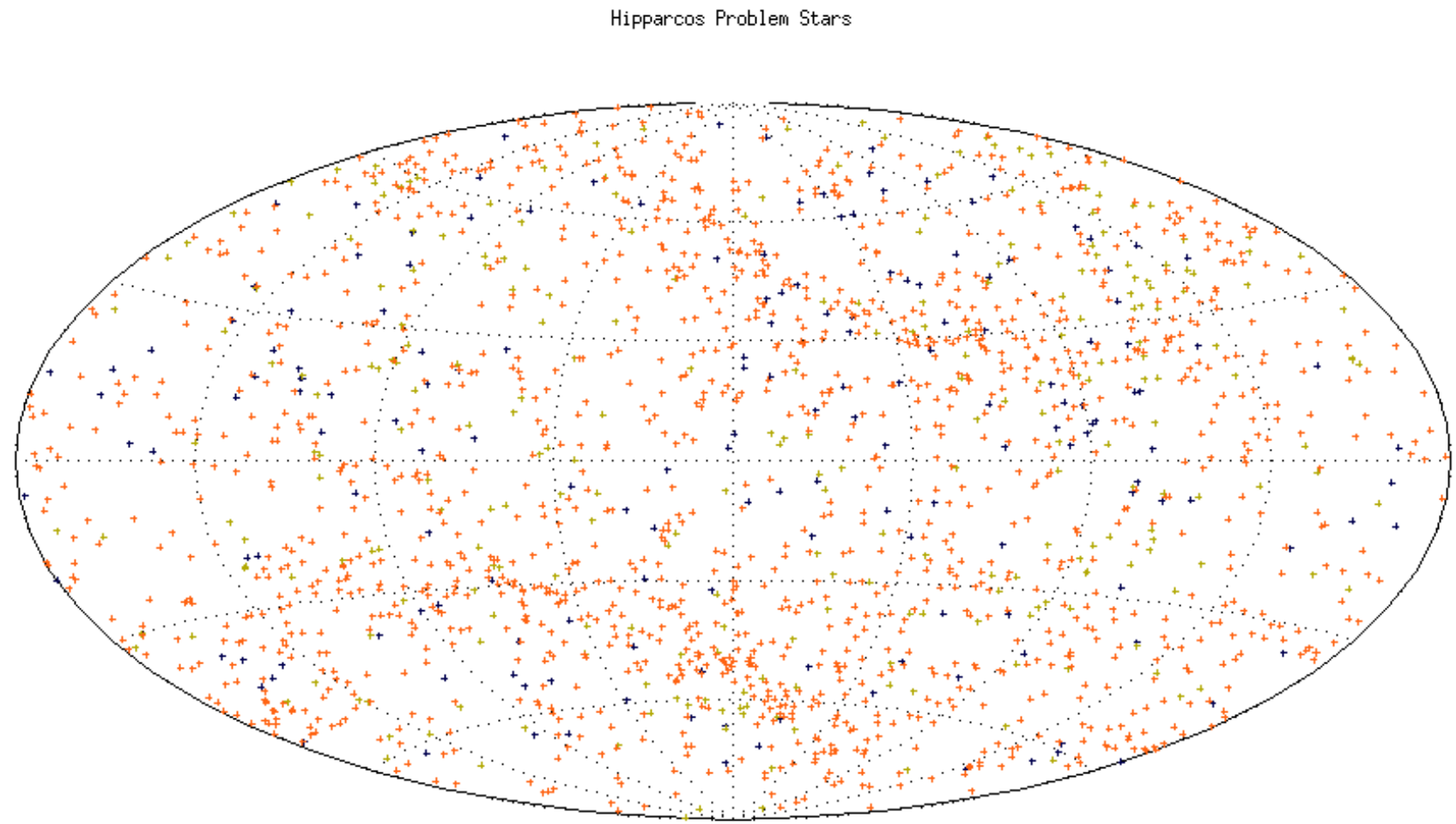
Hipparcos Problem Stars: O



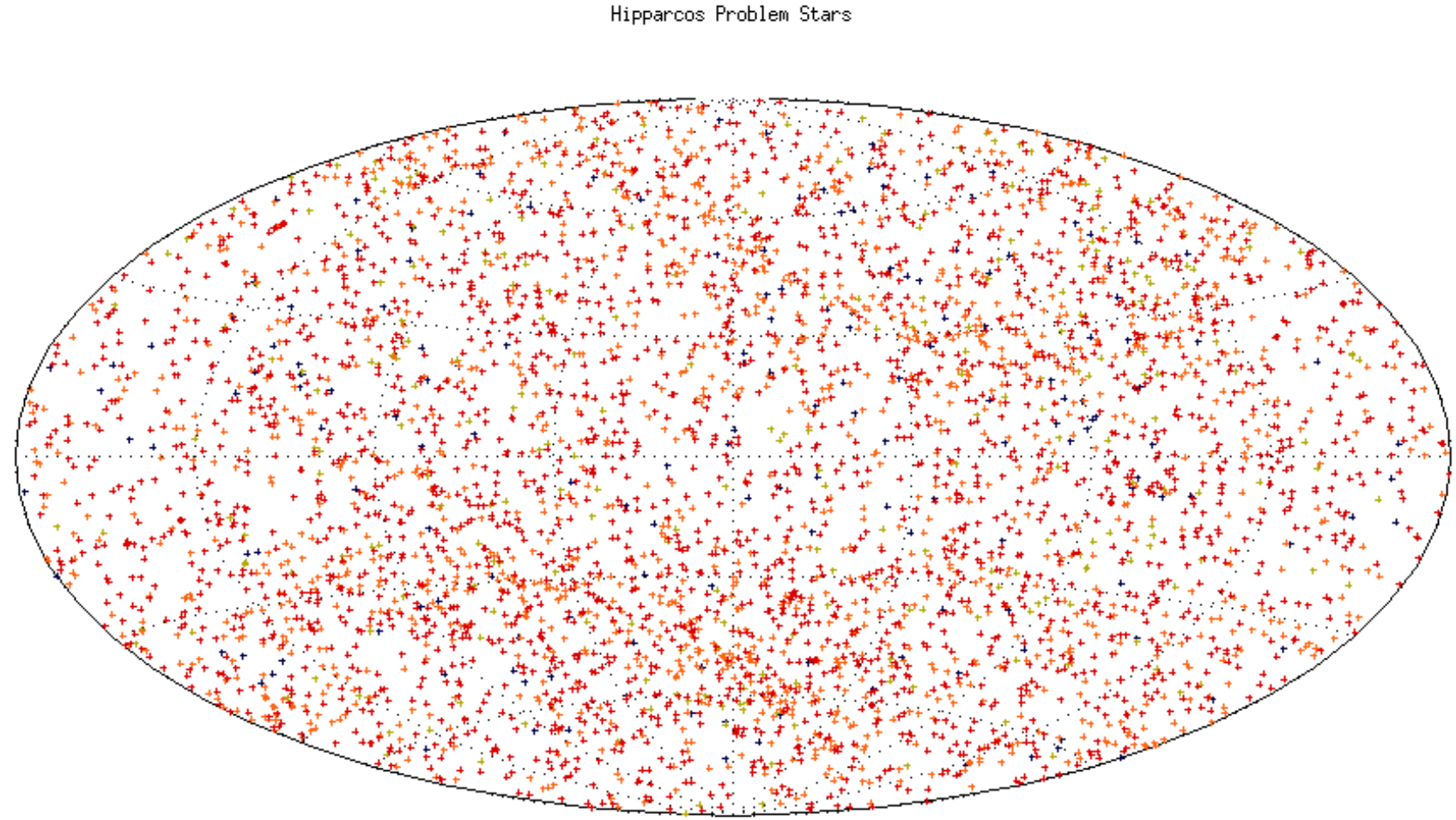
Hipparcos Problem Stars: OV



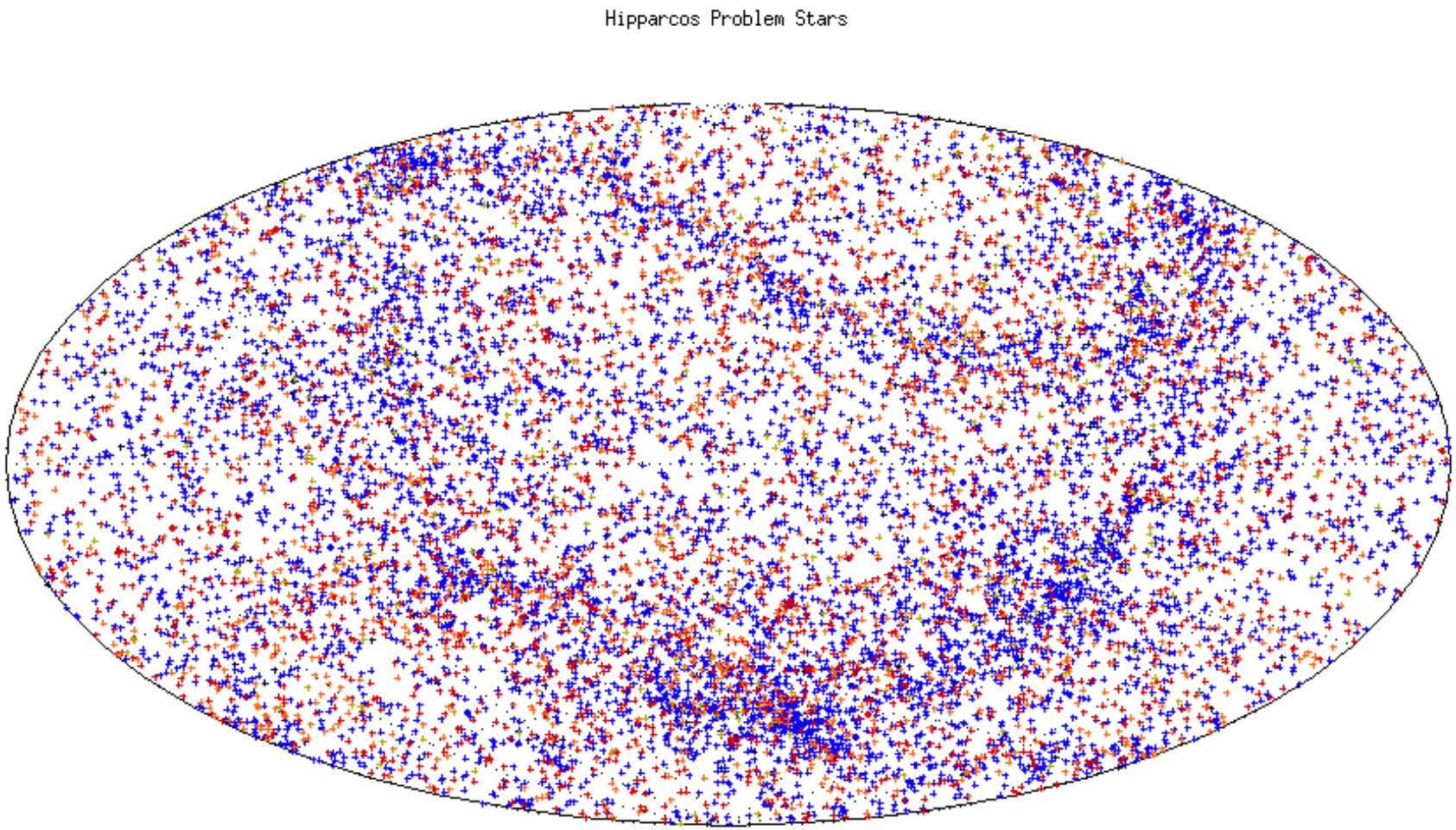
Hipparcos Problem Stars: OVX



Hipparcos Problem Stars: OVXG



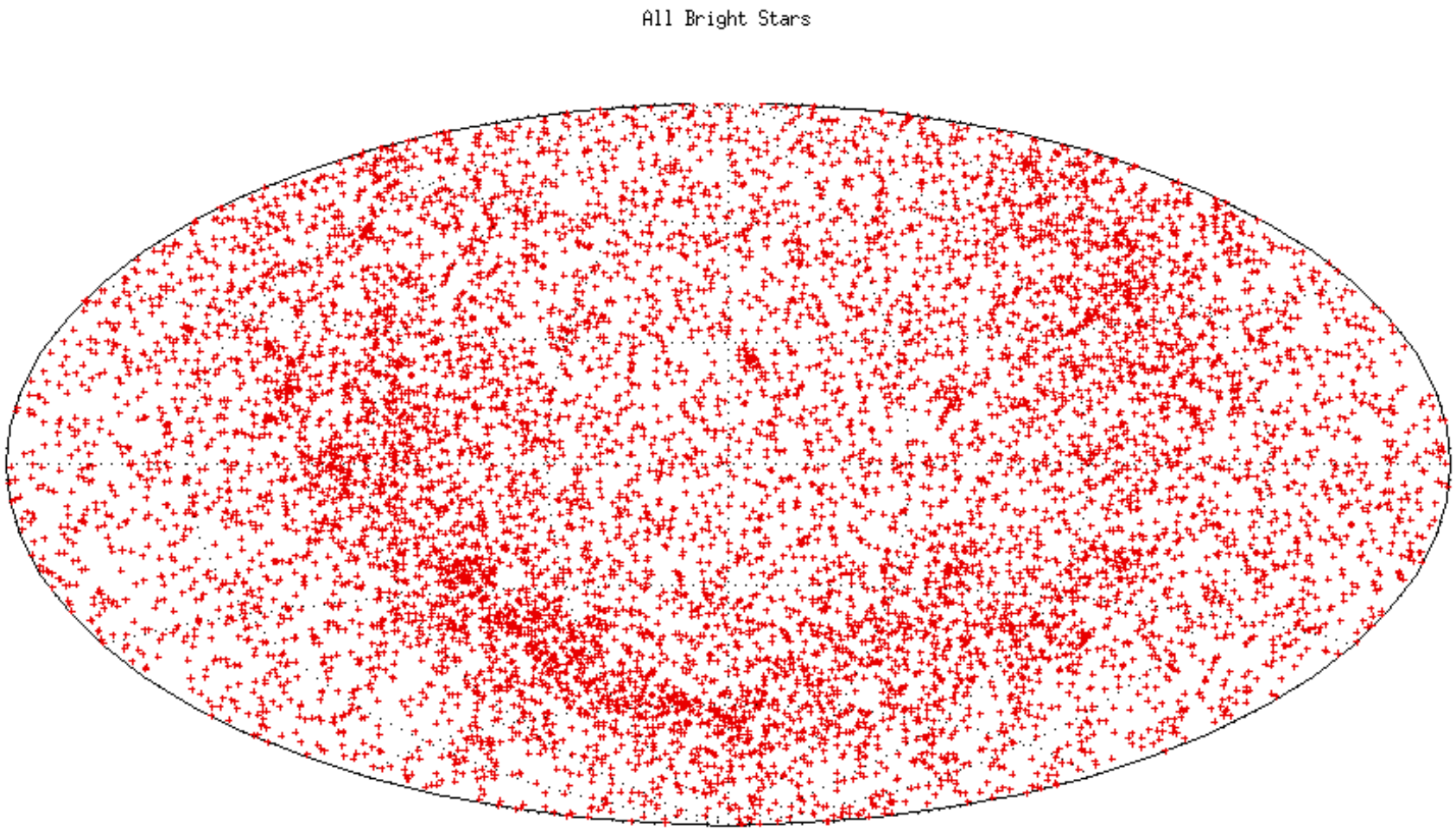
Hipparcos Problem Stars: OVXGS



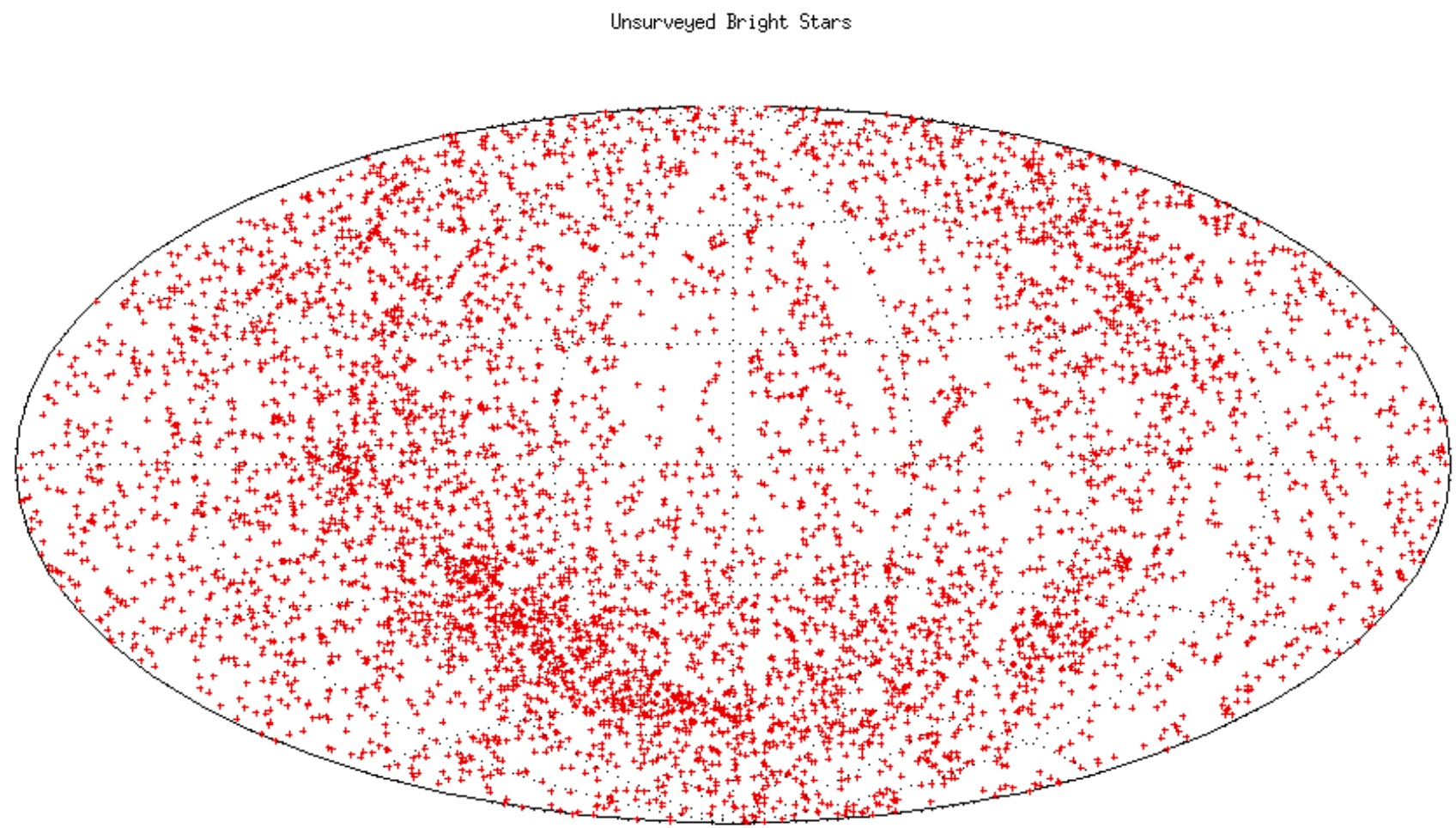
Yale Bright Star Catalog

- 9,110 stars brighter than V~6
- ~40% observed in 4m-class speckle surveys by CHARA and USNO
- 5,381 never surveyed with large telescopes
- All were observed by Hipparcos, so 4m-class telescope best for improved resolution

Yale Bright Star Catalog



Yale Bright Star Catalog



GSC Problem Stars

Hubble Guide Star Catalog

- Entire GSC includes 15+ million stars down to 16th mag
- Typically two guide stars rejected per week due to duplicity* (so far 3,237 over lifetime of HST)
- Noted as being "well-resolved, with separations usually greater than ~30 mas and Δm < ~1 mag" (Ed Nelan, private comm.)
- Nearly all magnitudes 9.5-16.0 (median 12.7)
- Initial check against WDS yields only 217 matches. *Most of these doubles have never been observed*

GSC Problem Stars

*** However…**

Checks (still ongoing) against UCAC4 found other issues:

- ~350-400 with no coordinate match within 20″
- 500+ with >1 UCAC star within 10″

Many are wide (few arcsec) pairs not resolved by GSC.

GSC Problem Stars

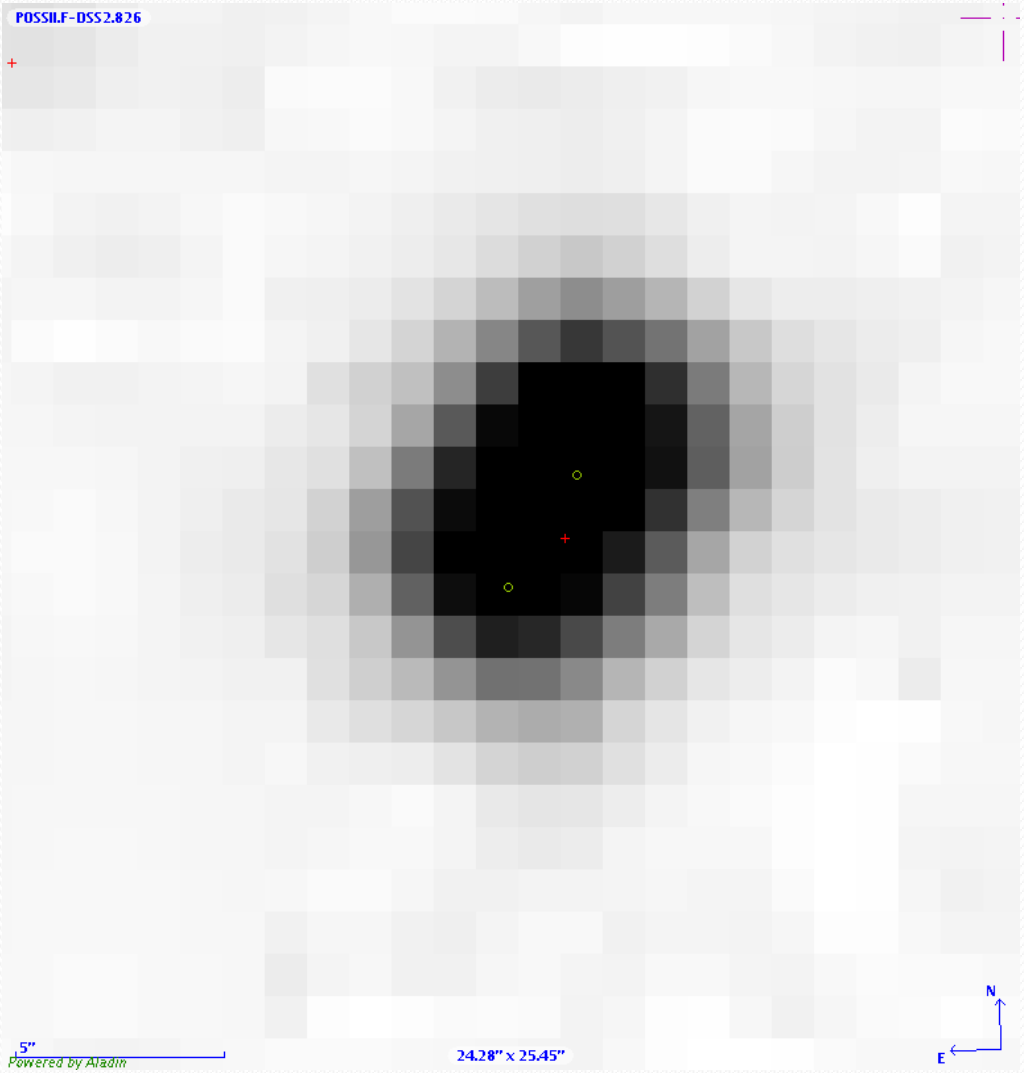
GSC3.2:

supposedly single

UCAC4:

3.2″ pair, mags 13.8 and 13.9

Pair not currently in WDS.



GSC Problem Stars

*** However…**

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Many are wide (few arcsec) pairs not resolved by GSC.

Still perhaps 1,000-2,000 possible speckle targets, but checks must be completed before added to obslists.

Other Possible Surveys

- **Exoplanet host stars**
  - Duplicity may mimic (or at least complicate) planetary detection
- **Surveys by spectral type**
  - Similar to O, Be, WR, G-dwarf surveys by CHARA and USNO teams
  - Better current detectors: nearby M dwarf survey
- **Spectroscopic binaries**
  - Additional targets for mass determination

Other Possible Surveys

- Exoplanet host stars
- Surveys by spectral type
- Spectroscopic binaries
- **High-velocity stars**
- **Pop II stars**
- **Nearby subdwarfs**
- **Nearby white dwarfs**

Shameless Plug

"For many of these, good proper motions will be key to finding them, and who is better for that than the USNO?"

- Brian Mason

Other Possible Surveys

"Millions of Multiples" followup

- Project to detect doubles by analyzing PSFs of stars in wide-field surveys
- *BinaryFinder* able to predict close pairs with <5% false-positive rate, measure θ to 2deg, ρ to 25%
- Estimate will find ~450,000 pairs with $\rho < 2''$ and R<18 in full Palomar dataset
- Expect to find millions down to 0.1″ in LSST data

Other Possible Surveys

- **Gaia followup**
  - How wide/faint/numerous will Gaia doubles be?
  - Numbers to bear in mind:
    - bright limit: “officially” V=6, in reality V=12?
    - resolution limit: 0.5″

Gaia will have little impact on most 4m speckle observations but major(?) impact on 2m speckle