NPOI Observations of 85 Stars and the Limb-Darkening Laws That Love Them

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The Sample

- Started with 21 targets:
  - Large stars (~few mas) observed in early 2013
- Added some of my unpublished targets
  - Mostly K giants, some exoplanet hosts
- Had a bit of a chat with Jim Benson
  - Added about 60 more from archival data
- Total: 85 stars

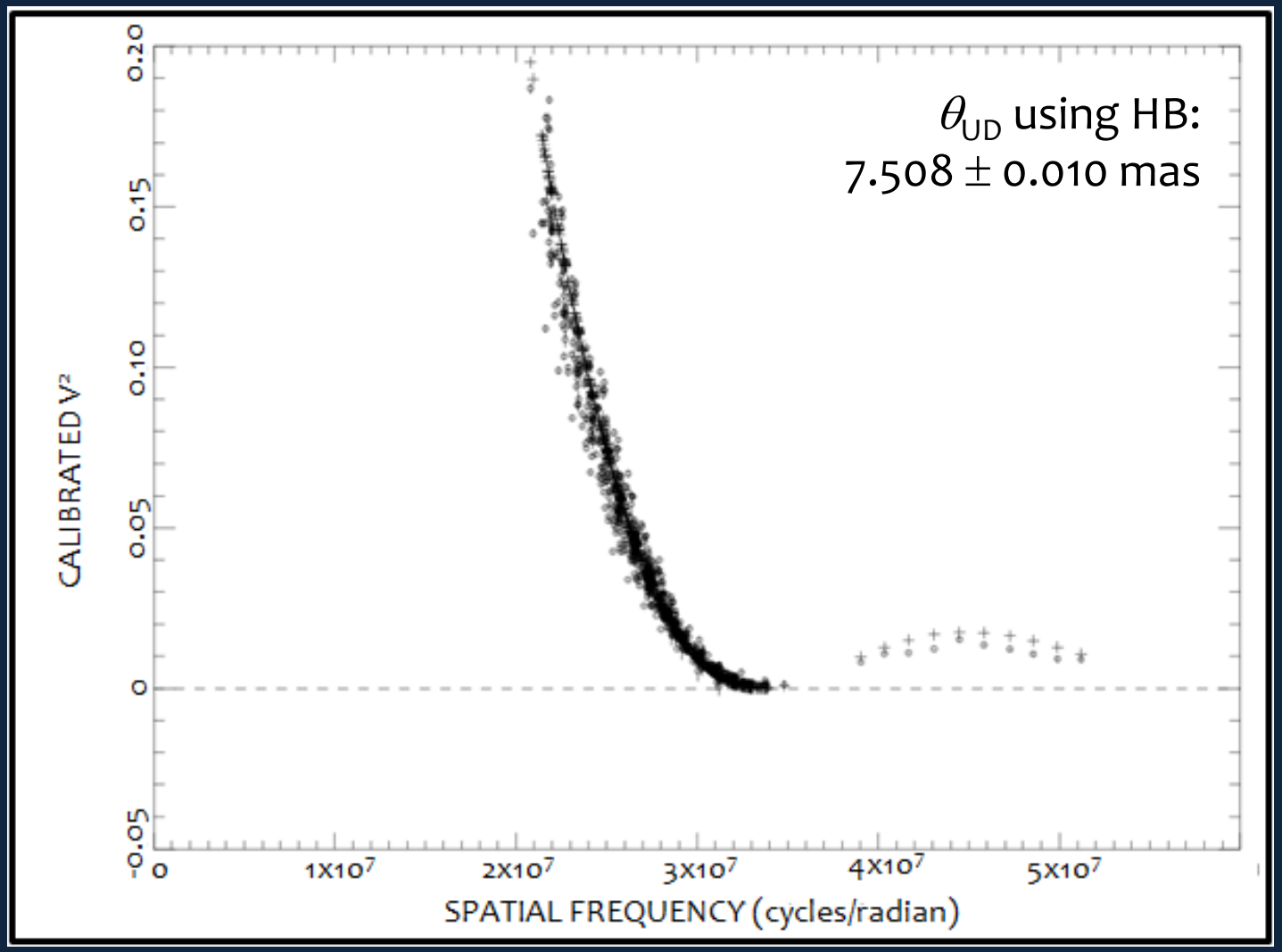
Zero Crossers

- Of 85 stars, 55 have data at the first null
- Of those 55, a handful have very clean data at null and beyond
- Not using zero crossing as diameter determination
  → Jorgensen and Armstrong working on that
- Our goal: test limb darkening laws

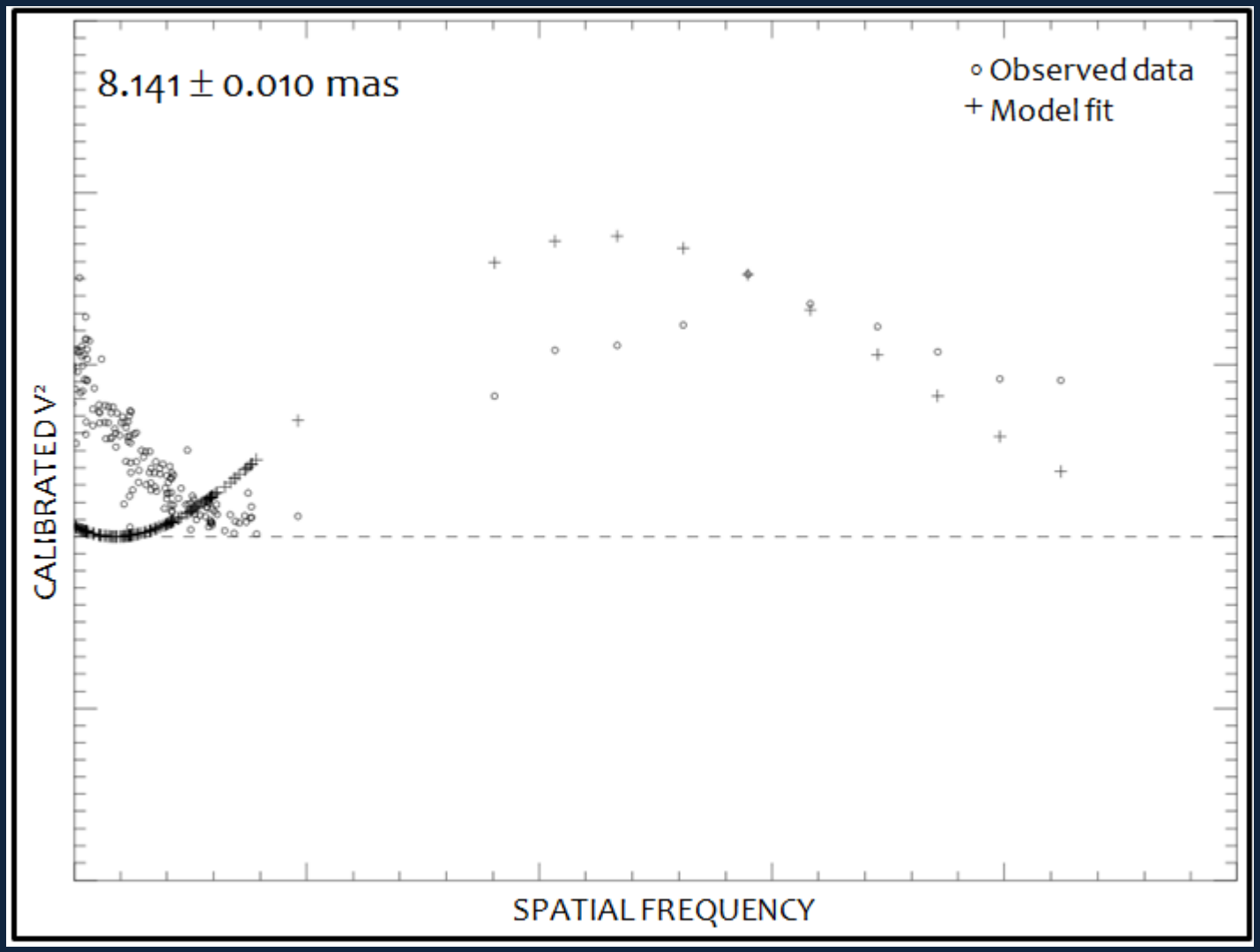
Stellar Models

- Plane parallel:
  - Example: Kurucz stellar models
  - Many don't like these
- Spherically symmetric:
  - Example: Neilson & Lester (2013)
  - May be more realistic interpretation of stellar interior
- We shall see.

Case Study: Pollux



Hanbury Brown LD fit



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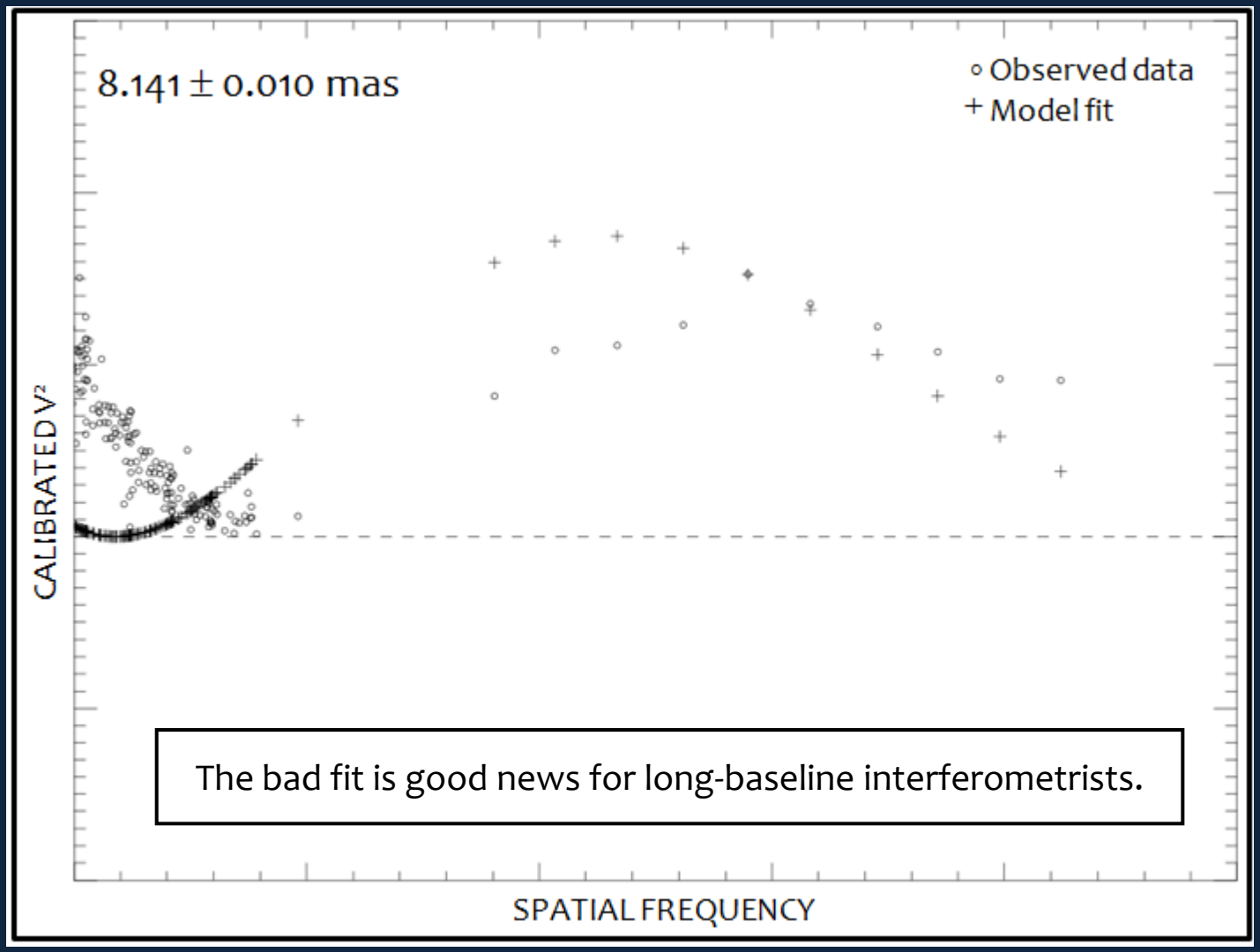
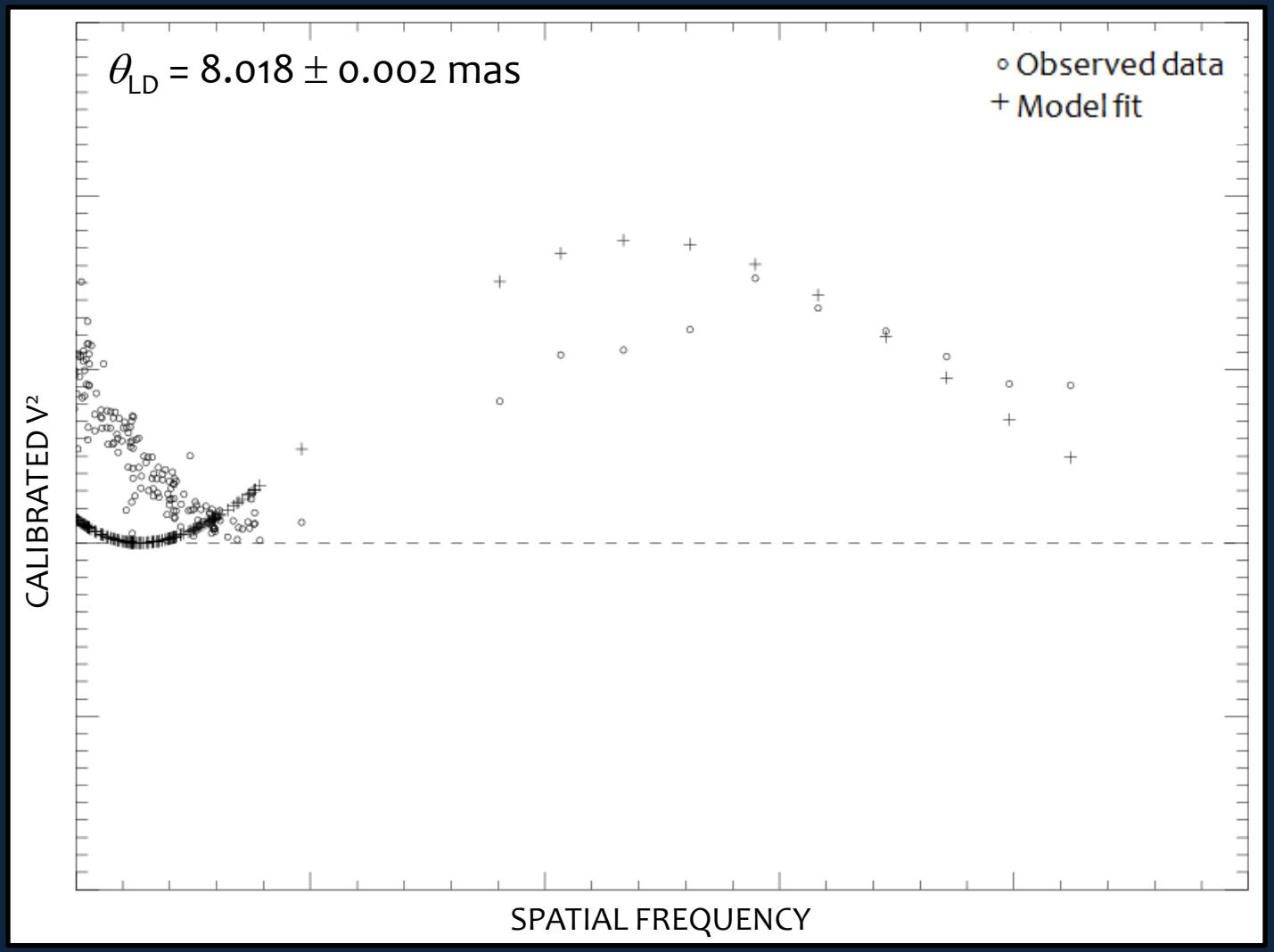


The bad fit is good news for long-baseline interferometrists.

Kurucz Plane Parallel Model



Neilson & Lester Spherical Model

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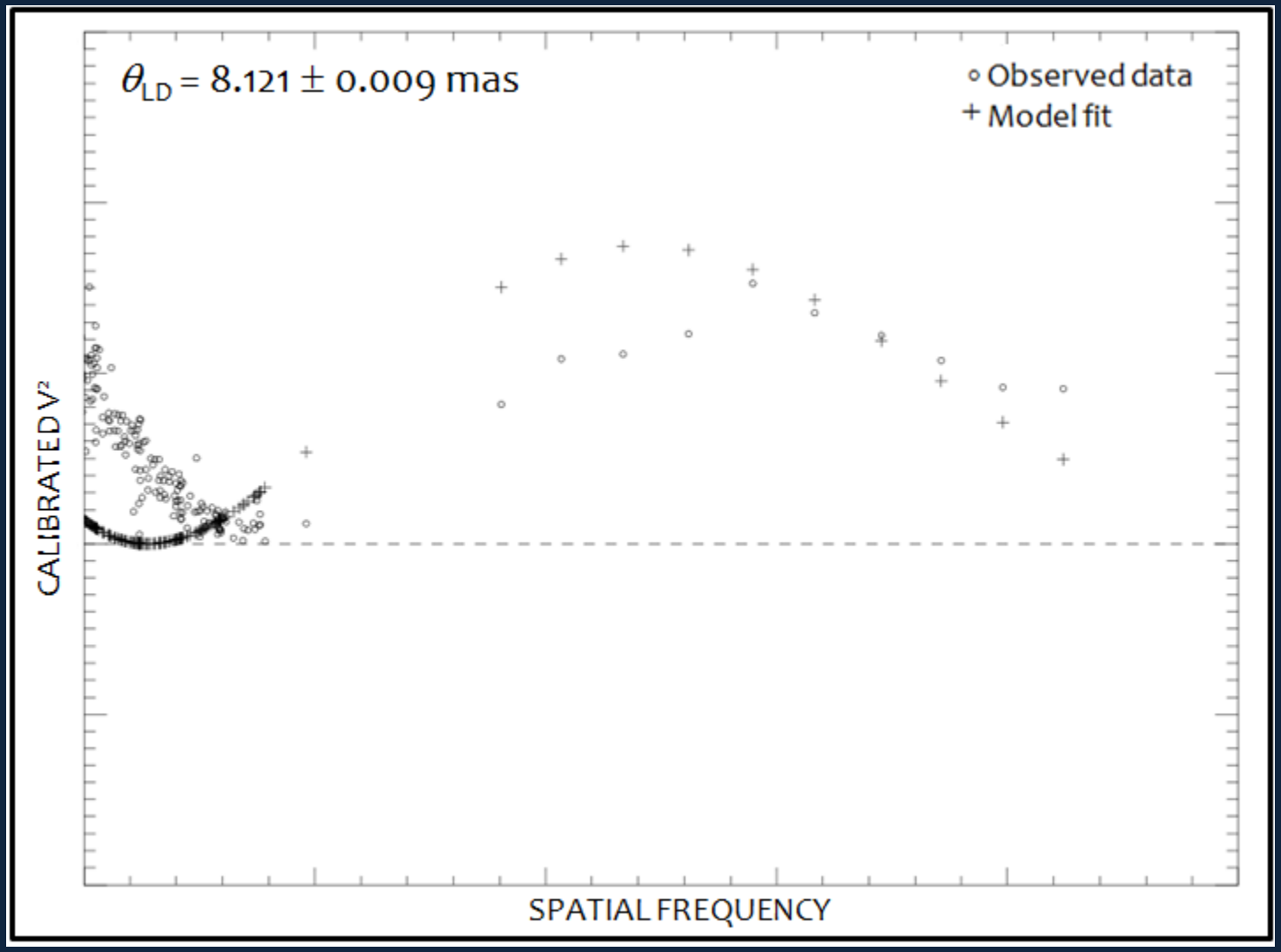
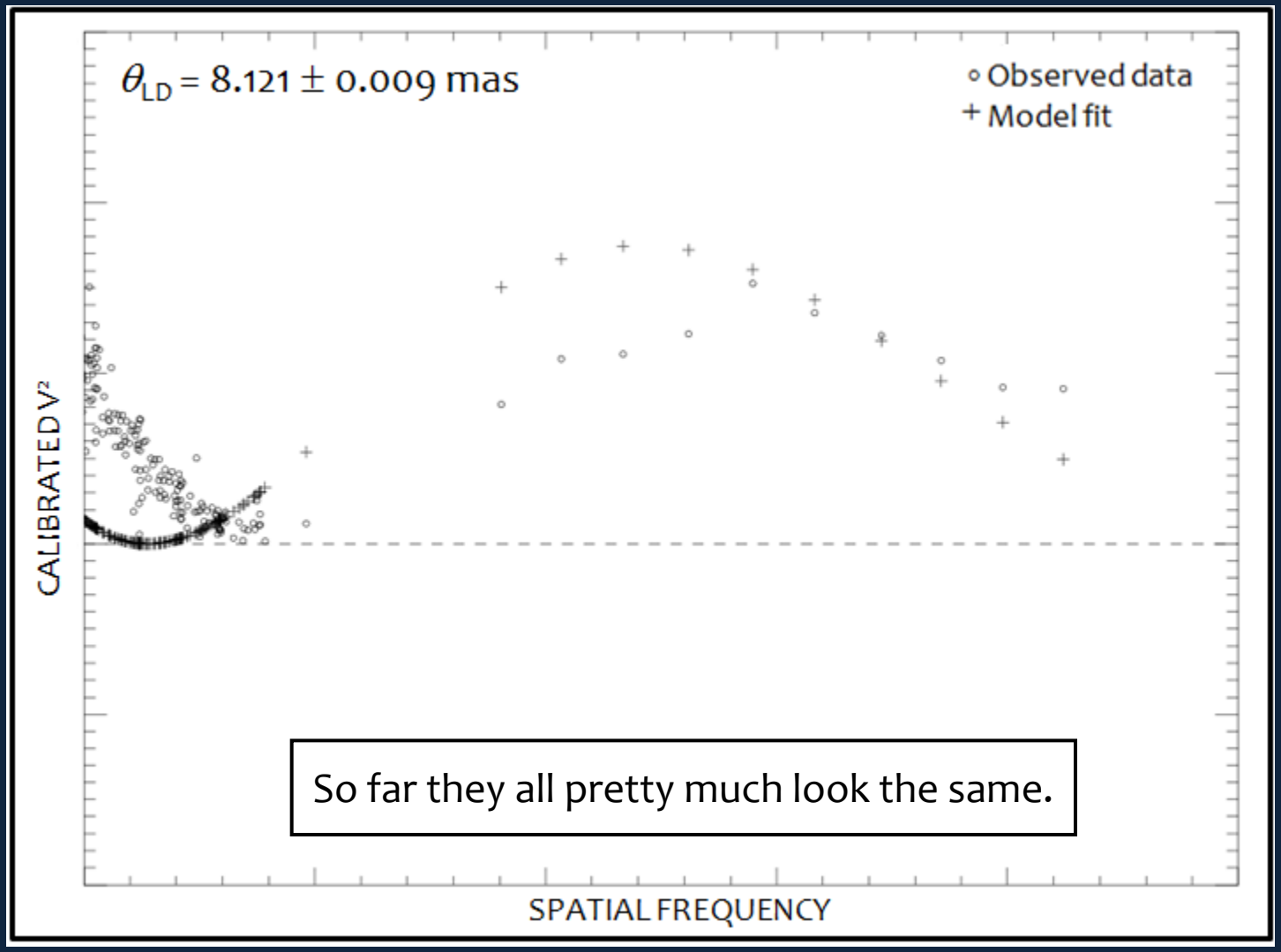


Neilson & Lester Spherical Model



The Plan

- Measured uniform disk diameters
- Continue to fit observed visibilities to various stellar models to derive limb darkened diameter
- See which models work best for the most stars
- Derive other perks: T_{eff}, R, F_{BOL}, L, etc.
- Publish

Benefits

- As longer baselines are used, finding unresolved calibrators becomes ridiculously difficult.

- Knowing which limb darkening law(s) work best will help better characterize calibrator stars in general.

- Also benefits stars with transiting planets:

  → The better you know the brightness profile, the more accurately you can measure transit events.