What can you do cross-matching TGAS, GOSSS, and high-resolution spectroscopic surveys of OB stars

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Spectroscopic, OB specific, high resolution

Survey	PI	#	# O	Resolution(s)	Sample	Spectral types	Epochs	Done
GOSSS	Maíz Apellániz	4000	1500	2500	N+S	O (+ B + WR)	1-few	70 %
OWN	Barbá + Morrell	275	250	15 000 - 46 000	S	O + WN	many	ongoing
IACOB	Simón-Díaz	525	150	23 000 - 85 000	N	O + B	3+	90 %
IACOB-sweG	Negueruela	100	60	85 000	N	O + B	1-few	yes
NoMaDS	Pellerin	120	75	30 000	dim N	O (+ B + WR)	1-few	yes
CAFÉ-BEANS	Negueruela	100	100	65 000	N	O	~10	90 %

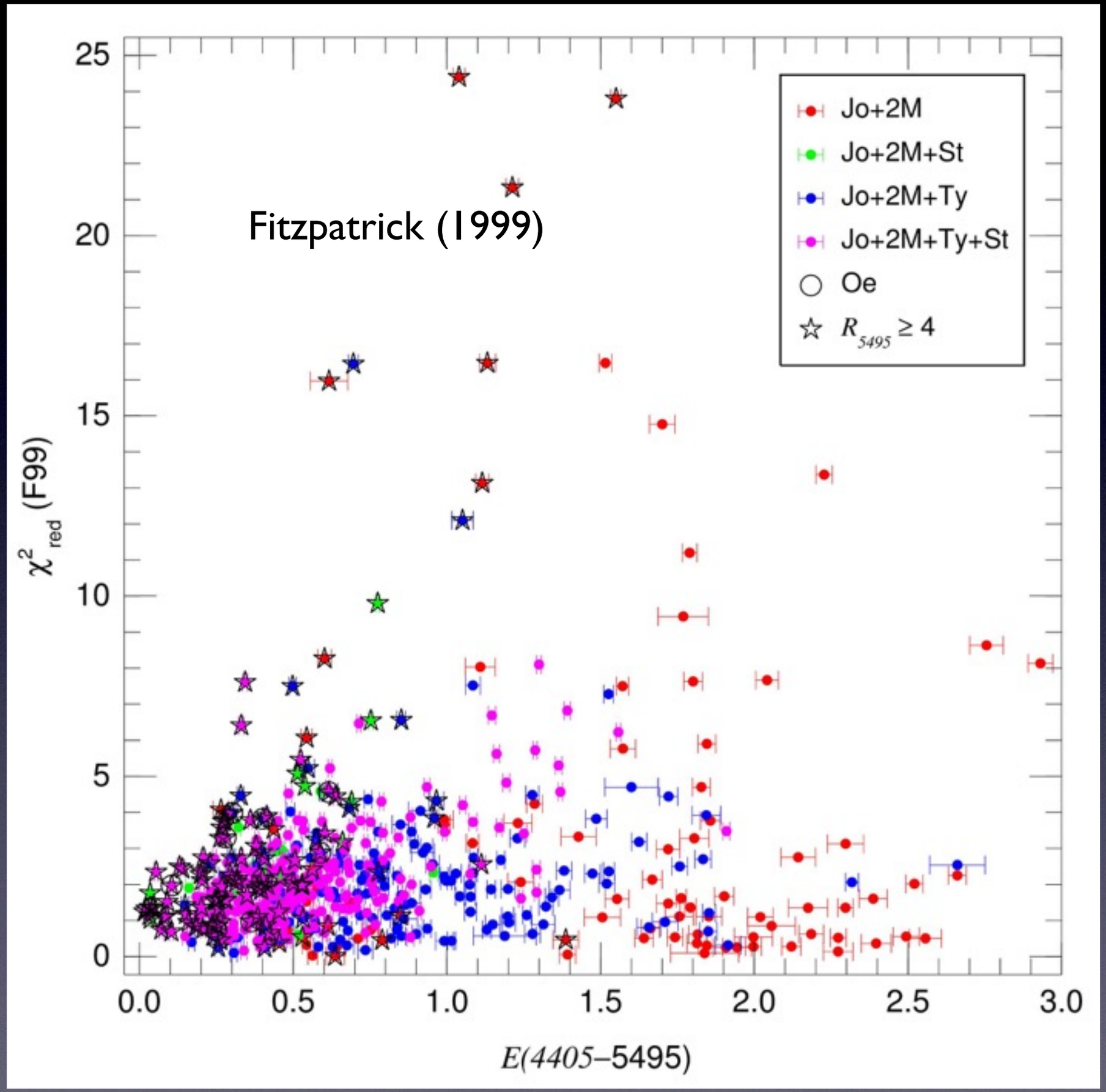
GOSSS description

- Long-slit spectroscopy of OB stars with *R*~2500 and S/N > 200 in 3900-5100 Å.
- Initial selection from the Galactic O-Star Catalog (GOSC).
- Telescopes and spectrographs:
  - ★ OSN 1.5 m (Albireo): $\delta > -20°$, $B < 11$
  - ★ LT 2.0 m (FRODOspec): $\delta > -35°$, $B < 11$
  - ★ CAHA 3.5 m (TWIN): $\delta > -20°$, $11 < B < 14$
  - ★ WHT 4.2 m (ISIS): $\delta > -35°$, $11 < B < 14$
  - ★ GTC 11.4 m (OSIRIS): $\delta > -30°$, $14 < B < 17$
  - ★ LCO 2.5 m (B&C): $\delta < +20°$ $B < 13$
  - ★ SOAR 4.1 m (GHTS): $\delta < +20°$, $13 < B < 15$
  - ★ Gemini South 8.1 m (GMOS): $\delta < +20°$, $13 < B < 16$
- 2154 stars (3519 spectra) processed (+ ~500 unproc.), compl. for $B < 8$.
- 590 O type-systems in three major papers (I:2011, II:2014, III:2016).

What can we do?

- Paper 0 (pre-TGAS): extinction.
  - ★ GOSSS I+II+III minus a few stars: ~570.
  - ★ Johnson (*U*)*BV* + 2MASS *JHK* for all.
  - ★ Tycho-2 *BV* + Strömgren *uvby* for some.
  - ★ *E*(4405-5495) and R_{5495} fit with CHORIZOS.
  - ★ Comparison between Cardelli et al. (CCM), Fitzpatrick (F99), and Maíz Apellániz et al. (MA14) extinction laws.
  - ★ A_V and spectroscopic distances (with binary corrections).

Testing the extinction laws in the Galaxy



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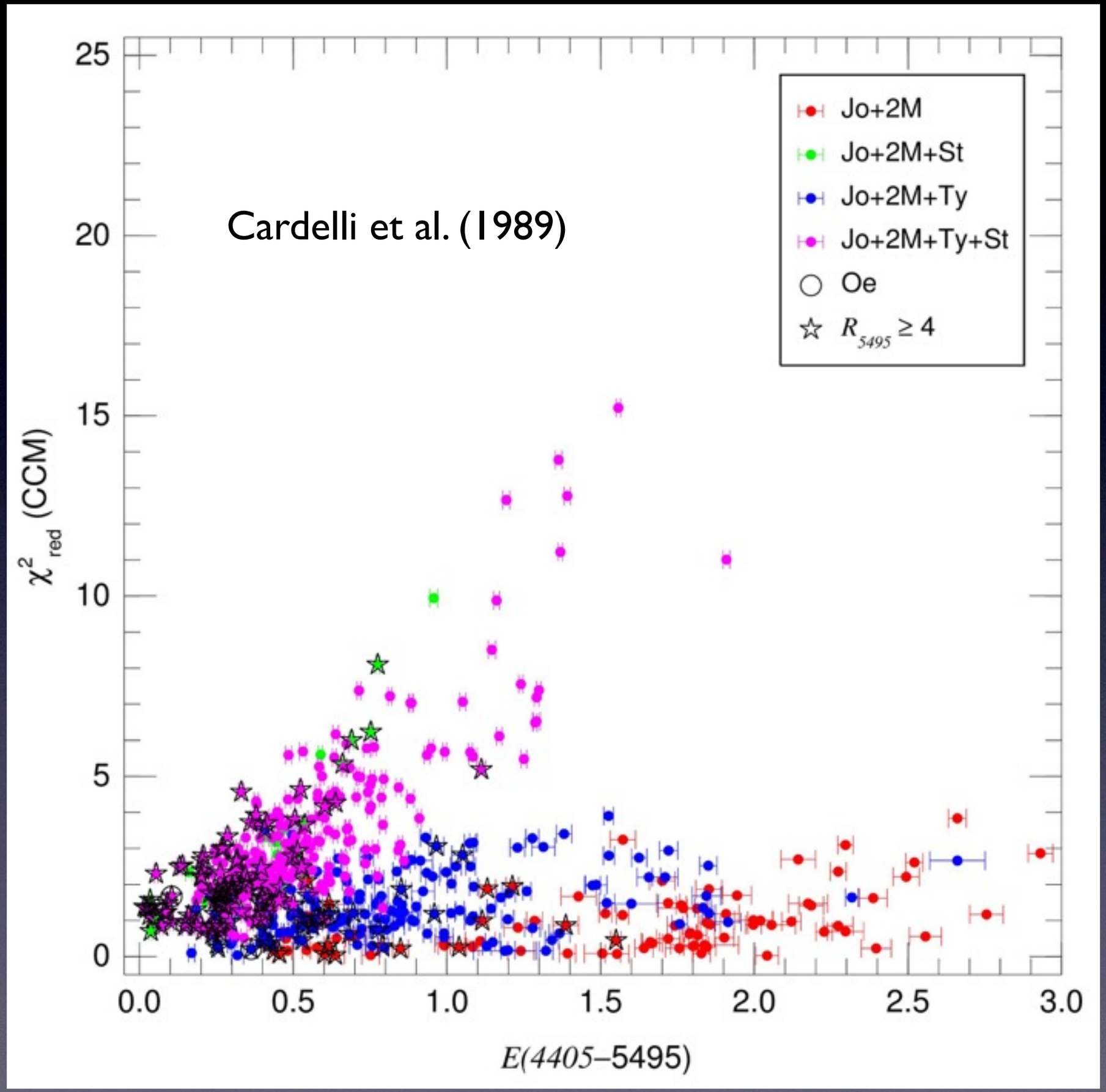

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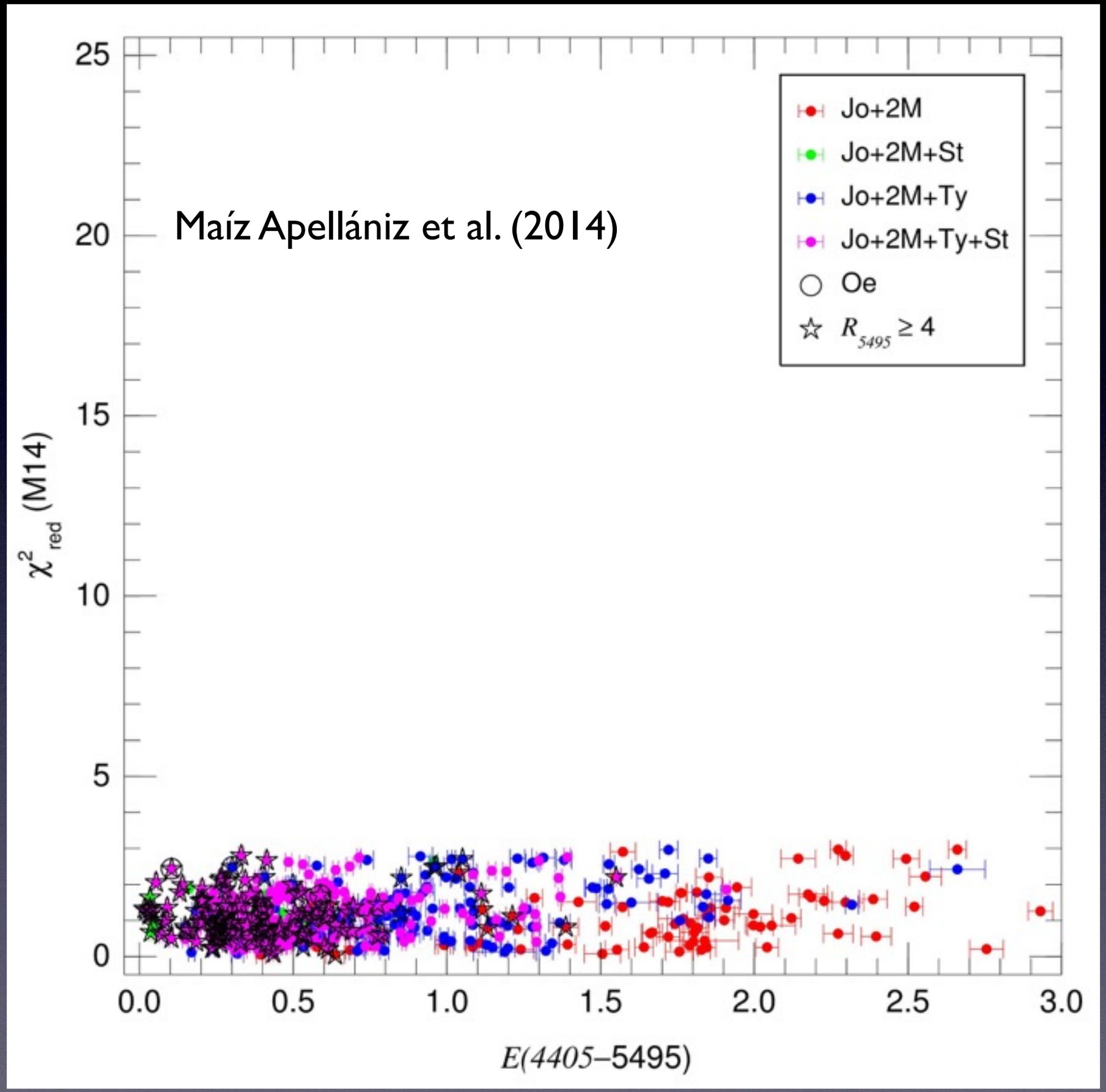

What can we do?

- Paper I (post-TGAS): 6-D coordinates.
  - ★ O stars selected from GOSSS I+II+III: 507 in Tycho-2.
  - ★ Of those, 387 with high-resolution multi-epoch data: binary-corrected velocities (RVS not useful for O stars).
  - ★ Of those, 75±25% expected to be in TGAS: ~300.
  - ★ 6-D coordinates (TGAS + v_{rad}) to 1-2.5 kpc.
  - ★ Preliminary distances to nearby clusters/associations.
  - ★ Spiral arms?

What can we do?

- Paper 11 (post-TGAS): stellar parameters.
  - ★ Ultimate purpose of high-resolution surveys such as IACOB.
  - ★ New ingredient 1: accurate distances (TGAS).
  - ★ New ingredient 2: accurate extinctions (paper 0).
  - ★ New ingredient 3: binarity (multi-epoch).
  - ★ Accurate radii and luminosities possible for the first time.

What can we do?

- Miscellaneous.
  - ★ Solving outstanding problems with distances to some “famous" objects.

What can we do?

- Future Gaia releases:
  - ★ More accurate distances.
  - ★ Larger Gaia sample.
  - ★ Larger GOSSS and high-resolution sample.
  - ★ Gaia photometry for extinction and comparison with other surveys.
  - ★ Candidate detection from RVS (but poor characterization).
  - ★ Constraints to spectroscopic binary orbits?
  - ★ Lots of new science!