The bottom of the Hertzsprung-Russell with *Gaia*

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"*BajaMasa*" research lines

- **EXOS:** exoplanetary systems
  - EXOS-1: astrometry of known systems **AMora**
  - EXOS-2: radial velocity of new systems **MRZO**
  - EXOS-3: characterization (asteroseismoloy) **AMoya**
- **YBD:** young brown dwarfs
  - Bottom of the (I)MF in stellar clusters and associations **VJSB**
- **MLT:** ultracool dwarfs
  - MLT-1: late M (H-R diagram, kinematics...) **JAC**
  - MLT-2: L y T (single or as companions) **JAC**

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- **EXOS:** exoplanetary systems
  - EXOS-1: astrometry of known systems → **new input from:**
    - **Radial velocity:** (SARG), CAFÉ, HARPS-N, GIANO, CARMENES, HORUS?
    - **Transit:** SuperWASP+, LCOGT, SONG, XO, Master
  - EXOS-2: radial velocity of new systems → ***Kepler*-like massive ground confirmation:** *everything* (above plus hi-res imaging; i.e., AstraLux, FastCam)
  - EXOS-3: characterization (asteroseismology) → **Enough time sampling with *Gaia*?** ("overlapping" with *PlanetVision*)

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- **YBD:** young brown dwarfs
  - Bottom of the (I)MF in stellar clusters and associations → **What can our telescopes do for *Gaia*'s YBDs** *vs.* **What can *Gaia* do for our telescopes' YBDs**

  Very low-mass stars and brown dwarfs in young open clusters have in general $V > 21$ mag (examples: σ Orionis, Pleiades)

  And do not forget the extinction, nebulosity…

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- **YBD:** young brown dwarfs
  - Bottom of the (I)MF in stellar clusters and associations → **#Q1: What can *Gaia* do for our telescopes' YBDs?**

  #A1a: **determine distance to clusters!** (or to bright primary in young moving group if YBDs are in resolved binary system). Note: *distance, age and model uncertainties are the largest error contributors to mass determination* (see *Gaia*-ESO survey)

  #A1b: direct parallax of **a few nearby YBDs** (e.g., Taurus). But Jordi et al. (2010)+

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- **MLT:** ultracool dwarfs
  - MLT-1: late M (H-R diagram, kinematics…) → *See next slide…*
  - MLT-2: L y T (single or as companions) → First, forget **T** (and **Y**) (e.g., ε Ind BC: *R* = 20.8 mag)**.** Next, **#Q2: how many L dwarfs *Gaia* will observe?**

#A2: **don't know!** Again, Jordi et al. (2010)+…

Please, talk to me later (convolve real L-dwarf spectra with *Gaia* bands, normalize with 2MASS *J* band, take densities from Caballero, Burgasser & Klement 2008, and count…)

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- **MLT:** ultracool dwarfs
  - MLT-2: L y T (single or as companions) → #A2: **don't know?**

    Gaia will give: **parallaxes** (absolutely needed) and **proper motions** (really needed?), **wide multiplicity** (example on astro-ph today)

    Telescopes will give: low-res spectroscopy for **SpT**-type determination (ISIS, ALFOSC, OSIRIS, EMIR)[New]

    20.03.2012: 602 L dwarfs, only ~40 with parallax**. Too optimistic pre-*Gaia* estimations?...**

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- **MLT:** ultracool dwarfs
  - MLT-1: late M (H-R diagram, astrophysical parameters, exoplanets, abundances, activity, multiplicity, kinematics…) → CARMENES, CARMENES, CARMENES… (R = 82,000, $\Delta\lambda$ **= 0.5-1.7** μ**m**, **1 ms^{-1}**)

  CARMENCITA: CARMENES Cool dwarf Information and daTa Archive ("the input catalogue")

carmenes

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- **MLT:** ultracool dwarfs

  CARMENCITA: all the brightest, latest M dwarfs observable from Calar Alto…

  Today: 1006 stars, over 80 columns (from accurate coordinates and proper motions, through spectral types, magnitudes, Hα and X-rays, to *vsini* or multiplicity at all separations)

  By construction, all $V < 21$ mag

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- **MLT:** ultracool dwarfs

  Gaia: abundances ($V < 12$ mag); T_{eff}, log$g$, *vsini* ($V <$ 13 mag); V_r ($V < 17$ mag); activity Ca II IR triplet ($V <$ 20 mag?); **proper motion, distance, astrometry (dynamical masses)** ($V < 21$ mag)

  CARMENCITA 2012-14 (on-going preliminary stellar characterization with CAFOS, CAFÉ, FastCam) + CARMENES 2015 + *Gaia* 2017? = **the M-dwarf Encyclopædia**

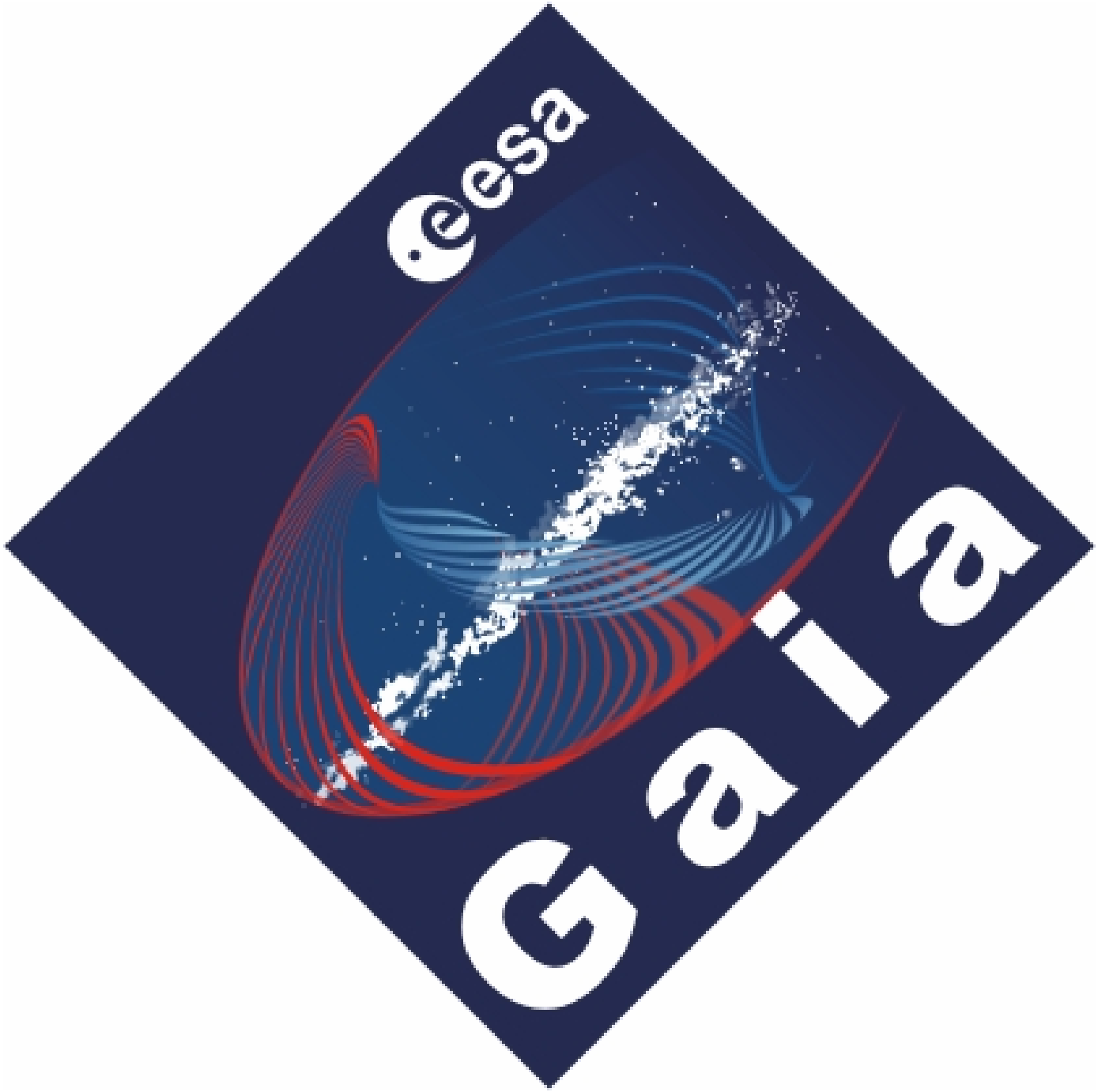
Last remarks

- Day+0: *Gaia* Third Data Release (~2017)
- Day+1: A&A paper on *d* to σ Orionis
- Day+2: VLMSs and BDs in the Pleiades?
- Day+5: bright, field, L-type dwarfs
- Day+10: CARMENCITA+CARMENES+*Gaia*

Last remarks

To TACs: more time with *current* instrumentation (lo- and hi-res spectroscopy, hi-res imaging)

To *Gaia* team: detectability of ultracool dwarfs; a "data-retriever simulator"; data releases: what and when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Gaia