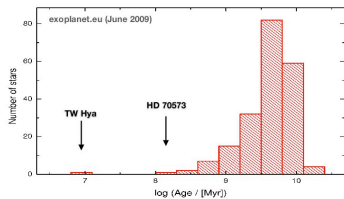


Exoplanet host stars in young moving groups: preliminary results

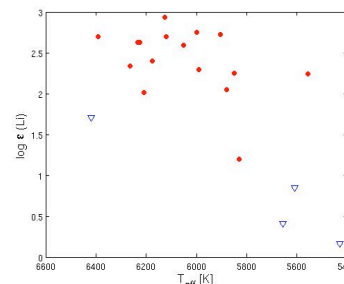
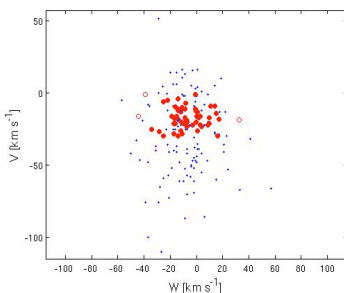
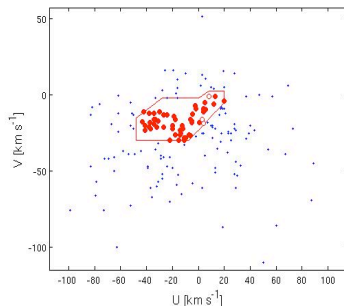
D. Montes¹, J. A. Caballero^{1,2}, L. J. Alloza², S. Bertrán de Lis³, A. Garrido Rubio³, R. Greciano², J. E. Herranz Luque², I. Juárez-Martínez³, E. Manjavas³, F. Ocaña³, B. Pila Díez^{2,3,4}, A. Sánchez de Miguel^{1,3}, C. E. Tapia Ayuga³, F. Anguita²

¹Departamento de Astrofísica de la Universidad Complutense de Madrid • ²Grupo de Ciencias Planetarias de Madrid
³Asociación de Astrónomos Aficionados de la Universidad Complutense de Madrid • ⁴Instituto de Astrofísica de Canarias



Interactive Extra-solar Planets Catalog

Star Name	Planet Name	Distance [pc]	Age [Myr]	Mass [M _J]	Semi-major axis [AU]	Orbital period [days]	Radial velocity [m/s]	Discovery Method
HD 10180	HD 10180 b	120.5	160	7.46	1.06	111	123	Radial velocity
HD 10180	HD 10180 c	120.5	160	13.7	7.44	111	123	Radial velocity
HD 10180	HD 10180 d	120.5	160	28.5	35.5	111	123	Radial velocity
HD 10180	HD 10180 e	120.5	160	40.2	52.0	111	123	Radial velocity
HD 10180	HD 10180 f	120.5	160	64.5	81.0	111	123	Radial velocity
HD 10180	HD 10180 g	120.5	160	100.0	127.0	111	123	Radial velocity
HD 10180	HD 10180 h	120.5	160	150.0	191.0	111	123	Radial velocity
HD 10180	HD 10180 i	120.5	160	220.0	280.0	111	123	Radial velocity
HD 10180	HD 10180 j	120.5	160	320.0	408.0	111	123	Radial velocity
HD 10180	HD 10180 k	120.5	160	450.0	576.0	111	123	Radial velocity
HD 10180	HD 10180 l	120.5	160	630.0	810.0	111	123	Radial velocity
HD 10180	HD 10180 m	120.5	160	870.0	1116.0	111	123	Radial velocity
HD 10180	HD 10180 n	120.5	160	1190.0	1524.0	111	123	Radial velocity
HD 10180	HD 10180 o	120.5	160	1630.0	2076.0	111	123	Radial velocity
HD 10180	HD 10180 p	120.5	160	2240.0	2856.0	111	123	Radial velocity
HD 10180	HD 10180 q	120.5	160	3080.0	3948.0	111	123	Radial velocity
HD 10180	HD 10180 r	120.5	160	4210.0	5388.0	111	123	Radial velocity
HD 10180	HD 10180 s	120.5	160	5740.0	7344.0	111	123	Radial velocity
HD 10180	HD 10180 t	120.5	160	7810.0	10032.0	111	123	Radial velocity
HD 10180	HD 10180 u	120.5	160	10640.0	13716.0	111	123	Radial velocity
HD 10180	HD 10180 v	120.5	160	14440.0	18432.0	111	123	Radial velocity
HD 10180	HD 10180 w	120.5	160	19700.0	24720.0	111	123	Radial velocity
HD 10180	HD 10180 x	120.5	160	26900.0	34416.0	111	123	Radial velocity
HD 10180	HD 10180 y	120.5	160	36600.0	46704.0	111	123	Radial velocity
HD 10180	HD 10180 z	120.5	160	49500.0	63024.0	111	123	Radial velocity



• **Context.** Young exoplanetary systems with ages $\tau \leq 600$ Ma (i.e. Hyades-like or younger) can provide constraints on the **time scale of planet formation** and its mechanism, and the **planet evolution** (orbital migration, late heavy bombardment...). Apart from the very young “planet” candidates found by **direct imaging** (around e.g. HR 8799, 2M1207-39 or AB Pic), some young planet candidates have been found with the **radial velocity** method, such as **HD 70573b** (Setiawan et al. 2007) in the Hercules-Lyra subgroup of the Local Association or the controversial **TW Hya b** (Setiawan et al. 2008). [left: histogram of planet ages, from Joergens (2009, ASTROCAM school)]

• **Aims.** We search for bright **Hipparcos** stars with **radial-velocity planets** that are member candidates in **young moving groups** (Montes et al. 2001), such as the Hyades, IC 2391, Ursa Majoris and Castor superclusters and the Local Association ($\tau = 100$ -600 Ma), and very young moving groups like β Pictoris or TW Hydrae ($\tau < 100$ Ma).

• **Methods.** On 2009 Sep 1, the **Extrasolar Planets Encyclopaedia** (exoplanet.eu [left: caption of an Encyclopaedia catalogue]) tabulated 346 planet candidates in **295 planetary systems** detected by radial velocity (35 multiple planet systems). Of them, **228 have Hipparcos** stars as host stars. **Galactocentric space velocities UVW** are derived from star coordinates, proper motions, **parallactic distances**, and **systemic radial velocities**, V_r . Since the values of V_r are usually **not** provided in planet discovery papers, we instead collect UVW velocities from dedicated works, such as Famaey et al. (2005), Soubiran et al. (2008) and, especially, **Holmberg et al. (2009)**. To date, we have collected **UVW velocities for 175 planetary systems** (77%). The UVW derivation for the other 53 planetary systems is on-going. We plot the compiled UVW velocities onto **UV and WV diagrams**. [left: top and bottom panels]

• **Results.** A total of **55 planet host stars satisfy the Eggen criterion** in the UV diagram (i.e. are young star candidates) [left: marked with a solid line]. Three of them have too large values of vertical Galactocentric space velocity W [left: marked with red open circles]. The remaining **52 stars** [left: marked with red filled circles] are the subject of a dedicated data compilation, including published values of effective temperature T_{eff} , lithium abundance $\log \epsilon(\text{Li})$, rotational velocities $v \sin(i)$, **activity indicators** ($\log R'_{\text{HK}}$) and **membership in a moving group**. Interestingly, a relatively large number of stars have been tabulated as probable nearby young stars. Most of them are candidate and confirmed members in the **Hyades Supercluster**, such as ι Hor, HD 50554, HD 108147 or τ Boo, but there also candidate stars in the **IC 2391** (94 Cet, HD 168746) or **Castor** (HD 217107) Superclusters and the **Local Association** (HD 130322, V376 Peg – the transiting star HD 209458). To ascertain the true young nature of the stars, we study the lithium abundance as a function of effective temperature [left: $\log \epsilon(\text{Li})$ vs. T_{eff} ; upper values marked with down triangles]. Some stars have clear **lithium overabundance**, such as the Hyades Supercluster star **HD 1237** ($T_{\text{eff}} = 5555$ K, $\log \epsilon(\text{Li}) = 2.24$).

• **Stay tuned!** In Porto next month, we will be back with further results on **exoplanet host stars in young moving groups...**



Universidad
Complutense
Madrid

