

The CHARA/SPICA Science Group Kick-Off Meeting



The working sessions

Tuesday, January 29, 2019

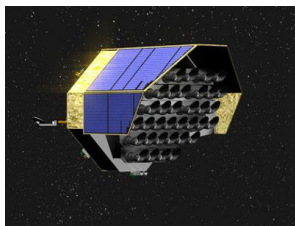
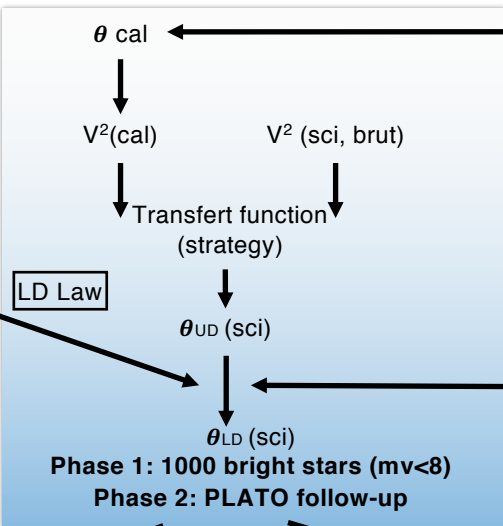
TIME	EVENT
08:30 - 08:45	Stellar evolution modeling (5+10) - Ana Palacios
08:45 - 09:00	Overview of 1D/3D atmosphere models (limb-darkening) (5+10) - P. Kervella/A. Claret
09:00 - 09:15	Multiplicity (5+10) - D. Graczyk/P. Harmanec
09:15 - 09:35	The ARIEL Space Mission (15+5) - V. Coudé du Foresto
09:40 - 10:55	SESSION-1: 3 Working Groups in //: (exoplanet host stars, asteroseismology and interferometry, surface brightness color relationships and fundamental parameters of stars). Definition of the astrophysical objectives - Criteria and tools to construct the list of targets.
10:55 - 11:15	Coffee break
11:15 - 12:30	SESSION-2: 3 Working Groups in // exoplanet host stars, asteroseismology and interferometry, surface brightness color relationships and fundamental parameters of stars): Methods to extract the fundamental parameters of stars, taking into account stellar evolution and atmosphere models, and binarity.
12:30 - 13:30	Lunch
13:30 - 13:45	Models of Spots (5+10) - R. M. Roettenbacher / D. Shulyak
13:45 - 14:00	3D Models of Convection (5+10) - A. Chiavassa / L. Bigot
14:00 - 14:15	Wind, environment (5+10) - M. Wittkowski
14:15 - 14:30	Models of rotating stars (5+10) - M. Rieutord / A. Domiciano
14:30 - 14:50	Discussion
14:50 - 16:20	SESSION-3: 5 Working Groups in //: (spots, convection, winds and environments, rotation, multiplicity): Impact of stellar activity and multiplicity across the HR diagram for the three main astrophysical objectives.
16:20 - 16:45	Coffee break
16:45 - 18:00	Preparation of synthesis in (3+4) small groups

Wednesday, January 30, 2019

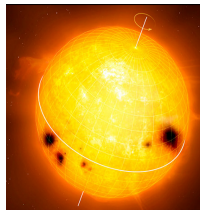
TIME	EVENT
08:30 - 08:55	WG1: Host Stars, synthesis of outcomes (Sessions 1 and 2) - Discussion
08:55 - 09:20	WG2: Asteroseismology and Interferometry: synthesis of outcomes (Sessions 1 and 2) - Discussion
09:20 - 09:45	WG3: SBCR and fundamental parameters of stars: Synthesis of outcomes (Sessions 1 and 2) - Discussion
09:45 - 10:00	Coffee break
10:00 - 10:25	WG on spots: synthesis of outcomes and discussion
10:25 - 10:50	WG on Convection: synthesis of outcomes and discussion
10:50 - 11:15	WG on Wind & Environment: Synthesis of outcomes and Discussion
11:15 - 11:40	WG on rotation: synthesis of outcomes and discussion
11:40 - 12:05	WG on multiplicity: synthesis of outcomes and discussion
12:05 - 12:30	Discussion
12:30 - 13:30	Lunch



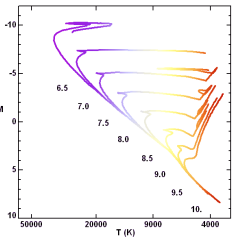
Atmosphere models
(T_{eff} , $\log(g)$, Z , v_t)



Stellar Activity
Spots
Granulation
Wind/Environment
Rotation
Multiplicity



- . **Session 1: Definition of objectives 1, 2, 3**
- . **Session 2: age_{\star} R_{\star} M_{\star} $T_{\text{eff},\star}$ How? Taking into account evolution/atmosphere models and binarity (mass)**
- . **Session 3: impact of stellar activity on the three objectives**



EXOPLANET HOST STARS

Evolution Atmosphere Models Binarity

π Gaia

Stellar activity

age_{\star} R_{\star} M_{\star} $T_{\text{eff},\star}$

Transits ρ_{\star}

RV

R_p M_p

ρ_p

Objective 1: Life Habitable Zone

Model of Planets

ASTEROSEISMIC TARGETS

Evolution Atmosphere Models Binarity

π Gaia

Stellar activity

Scaling relations

age_{\star} R_{\star} M_{\star} $T_{\text{eff},\star}$

Objective 2: Fundamental parameters

STANDARD STARS

Evolution Atmosphere Models Binarity

SED Analysis Diagnostic of activity

Homogeneous Photometry

age_{\star} R_{\star} M_{\star} $T_{\text{eff},\star}$

Objective 3a: Surface-Brightness Color Relations (SBCR) for all types and classes corrected from stellar activity

Tool for faint stars observed by PLATO (phase 2)

Objective 3b: Distance scale $H\alpha$

Session 1: Definition of the astrophysical objectives (3 WGs)

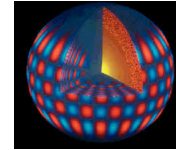
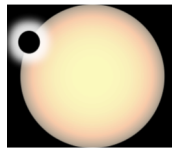
- **Inputs:** limitations of SPICA/CHARA ($mV < 8$, $\delta > -30$, $\theta > 0.2$ mas), interfaces with PLATO, Gaia, Araucaria Project and ARIEL (etc...)
- **Outputs:**
 - Definition of the Astrophysical objective ? Are there different sub-objectives ? Which precision ? Which priority ?
 - Do we need tools to prepare such list ?
 - How to optimize the survey on sky in term of efficiency, precision, ...
 - Issues for the reference stars ?
 - Which kind of stars (spectral type, classes) are interesting with respect to this objective ?
 - Do we need complementary observations ?
 - Do we need to develop models ?
 - What are the mandatory informations required to define the list of targets for phase 1 of CHARA/SPICA ? If yes, how ? Which criteria ?

Session 2: Methods to extract the fundamental parameters of stars, taking into account stellar evolution and atmosphere models, and binarity (The same 3 WGs)

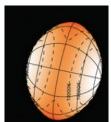
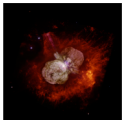
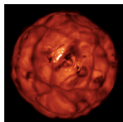
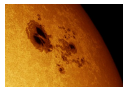
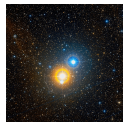
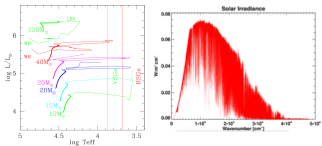
- **Inputs:** mini-talks about stellar evolution and atmosphere models + multiplicity. Reminder: we would like to build a database for the 1000 targets observed by CHARA/SPICA (phase 1) + others (phase2) with fundamental parameters: age, radius, mass, T_{eff}
- **Outputs:**
 - Are there different ways in order to derive such parameters ? Is it consistent with the astrophysical objective already defined ?
 - Which atmosphere models are the best depending on the position of the star in the HR diagram ?
 - Which evolution models are the best depending on the position of the star in the HR diagram ?
 - How can we deal with binarity ? How to verify that a object is a binary or not ? If it is a binary, can we derive the mass ?
 - How to derive preliminary parameters in order optimize/validate observations ? How to manage the validation of the observations of 30-40 per night ?
 - How to manage complementary observations ?

Session 3: Impact of stellar activity and multiplicity across the HR diagram for the three main astrophysical objectives (5 WGs).

- **Inputs:** mini-talks about stellar activity.
- **Outputs:**
 - What is the impact of the **given** activity (spots, granulation, wind/environment, rotation, binarity) on the **three astrophysical objectives** ?
 - How to define the 200 bright stars ($m_V < 5$, $\theta > 0.7$ mas) for which we will characterize the 'activity' through surface and environment imaging ?
 - Other complementary ways to characterize the activity ? SED ? Models ?
 - How to inject this (images, SED, models) when calibrating and using the SBCR for faint stars ?
 - Is the strategy different depending on the spectral type and/or class of the object ?
 - The idea is to fill the following table (next slide).



	Exoplanet Host Stars	Asteroseismology	SBCR (distances & PLATO faint targets)
Objectives (session 1)			
Stellar parameters (session 2)			
Spots			
Convection			
Winds Environment			
Rotation			
Binarity			



The working groups

LASTNAME	FIRSTNAME	Arrival date	Departure date	Talk(15+5)	Talk(5+10)	Lunch Monday	Lunch Tuesday	Lunch Wednesday	Chairperson	Exopns	Astero	SBC	spots	convection	winds	rotation	multiplicity		
Albrecht	Simon	28/01/2019	30/01/2019			Yes	Yes	Yes											
Belkacem	Kevin	29/01/2019	30/01/2019	x		No	Yes	Yes			x					x			
Berio	Philippe	28/01/2019	30/01/2019			Yes	Yes	Yes	Monday Afternoon		x				x				
Bigot	Lionel	28/01/2019	30/01/2019			Yes	Yes	Yes			x			x					
Borgniet	Simon	28/01/2019	31/12/2018			Yes	Yes	Yes		x				x					
Catala	Claude	28/01/2019	30/01/2019			Yes	Yes	Yes			x		x						
Chelli	Alain	28/01/2019	29/01/2019			No	Yes	No				x					x		
Chiavassa	Andrea	28/01/2019	30/01/2019		x	Yes	Yes	Yes		x				x					
Coudé du Foresto	Vincent	29/01/2019	29/01/2019	x		No	Yes	No		x			x						
Creevey	Orlagh	28/01/2019	30/01/2019	x		Yes	Yes	Yes			x						x		
David	Lester	28/01/2019	30/01/2019			Yes	Yes	Yes		x				x					
Domiciano de Souza	Armando	28/01/2019	30/01/2019			Yes	Yes	Yes	Tuesday Afternoon			x				x			
Duvert	Gilles	28/01/2019	30/01/2019			Yes	Yes	Yes				x		x					
Fedou	Pierre	28/01/2019	29/01/2019			Yes	Yes	No		x					x				
goupil	mariejo	28/01/2019	29/01/2019			No	Yes	No			x					x			
Graczyk	Dariusz	27/01/2019	02/02/2019	x	x	Yes	Yes	Yes				x					x		
Guillot	Tristan	28/01/2019	30/01/2019			No	Yes	Yes		x			x						
Kervella	Pierre	28/01/2019	30/01/2019		x	Yes	Yes	Yes				x					x		
Lagadec	Eric	28/01/2019	29/01/2019			Yes	Yes	No				x			x				
Lanthermann	Cyprien	28/01/2019	30/01/2019			Yes	Yes	Yes		x				x					
Lebre	Agnès	28/01/2019	30/01/2019			Yes	Yes	Yes				x			x				
Ligi	Roxanne	28/01/2019	30/01/2019			Yes	Yes	Yes		x			x						
Meilland	Anthony	28/01/2019	01/02/2019			No	No	No	Wednesday Morning		x					x			
Morand	Frederic	28/01/2019	30/01/2019			Yes	Yes	Yes			x						x		
Morel	Thierry	27/01/2019	30/01/2019	x		No	Yes	Yes		x				x					
Mourard	Denis	28/01/2019	30/01/2019			Yes	Yes	Yes			x		x						
NARDETTO	Nicolas	28/01/2019	30/01/2019			Yes	Yes	Yes				x				x			
PALACIOS	Ana	28/01/2019	29/01/2019		x	No	Yes	No		x					x				
Patru	Fabien	30/01/2019	30/01/2019			No	No	Yes											
Perraut	Karine	28/01/2019	30/01/2019			Yes	Yes	Yes				x		x					
Rieutord	Michel	28/01/2019	30/01/2019		x	Yes	Yes	Yes				x				x			
Roettenbacher	Rachael	27/01/2019	31/01/2019		x	Yes	Yes	Yes		x			x						
Salsi	Anthony	28/01/2019	30/01/2019			Yes	Yes	Yes				x					x		
Tallon-Bosc	Isabelle	27/01/2019	30/01/2019			Yes	Yes	Yes	Tuesday Morning			x			x				
Wittkowski	Markus	28/01/2019	30/01/2019		x	Yes	Yes	Yes				x			x				
						26	33	28				11	10	12	7	7	7	6	6