GREAT-ESF Workshop

Stellar Atmospheres in the Gaia Era:

Quantitative Spectroscopy and Comparative Spectrum Modelling

Free University Brussels - VUB
Building D Campus Oefenplein
23 & 24 June 2011

http://great-esf.oma.be Great.esf@oma.be

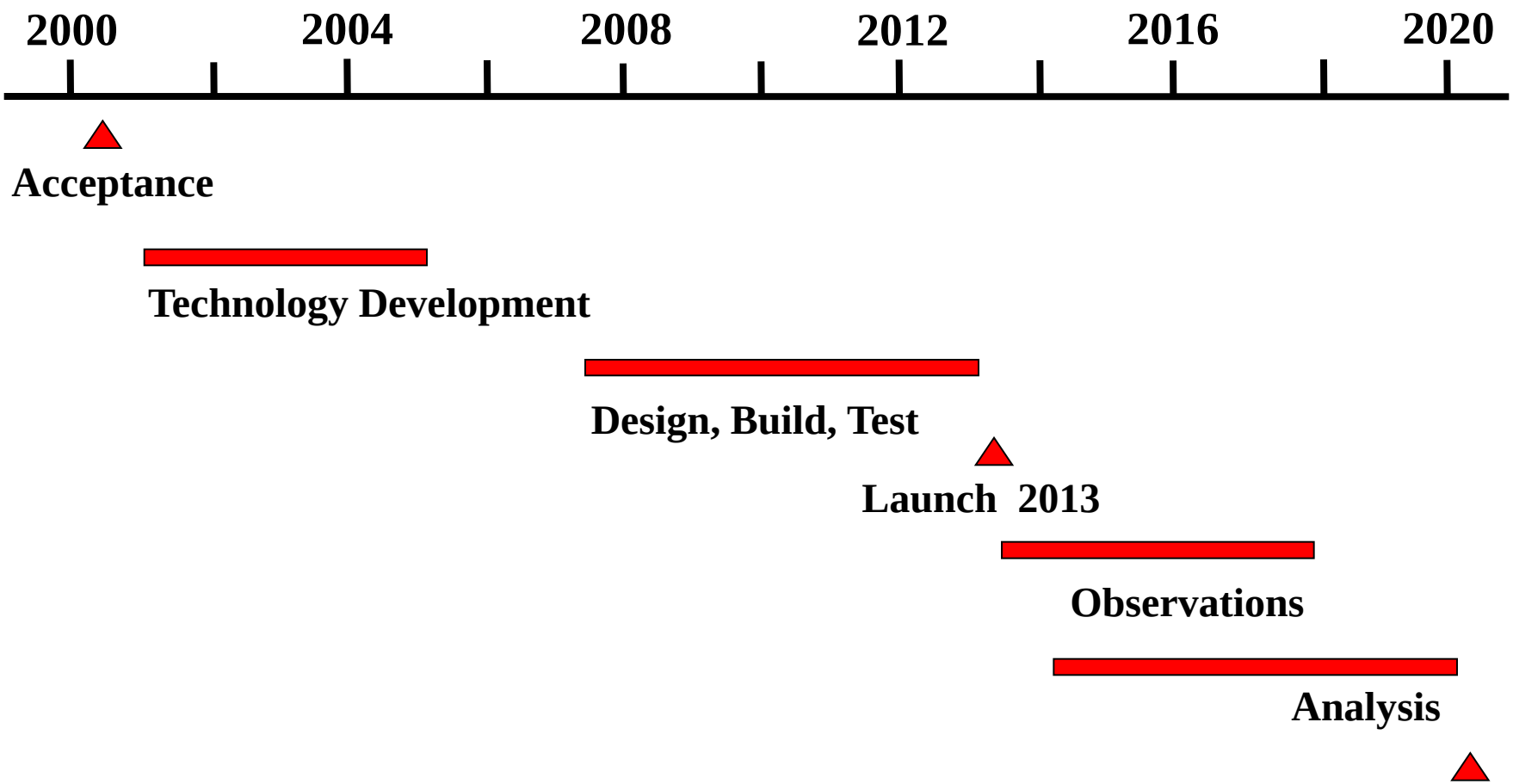
SOC:
J. Groh (MPI, Bonn, Germany)
P. Hauschildt (Obs. Hamburg, Germany)
U. Heiter (Univ. Uppsala, Sweden)
A. Lobel (Royal Obs. of Belgium, Brussels)
B. Plez (Univ. Montpellier, France)
N. Przybilla (Obs. Bamberg, Germany)
R. Sordo (INAF Padova, Italy)

LOC:
J.-P. De Greve (VUB)
A. Lobel (ROB)
W. van Rensbergen (VUB)

GREAT
European Science Foundation
FWO Vlaanderen
Vrije Universiteit Brussel

ESA-GAIA Launch May 2013

ESA-Gaia Mission Schedule



more than a decade of preparation...

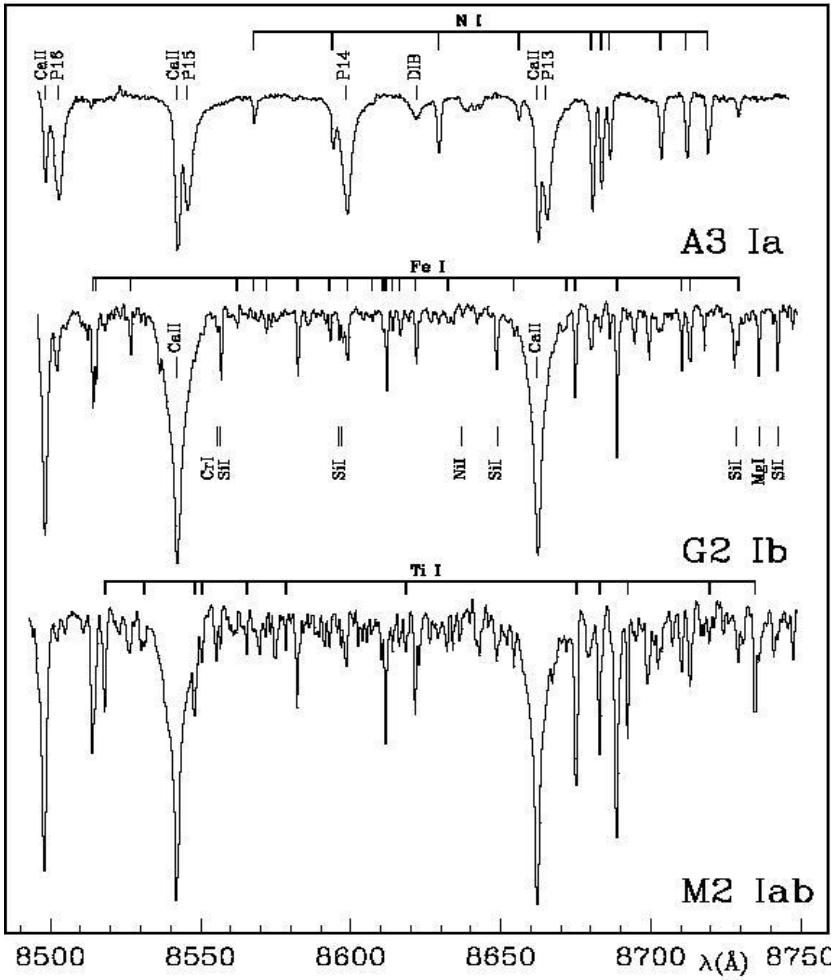
- **Observe over 1 billion sources ~80 times each to V=20 mag.**
- **Astrometry and photometry for every source**
- **Astrometric accuracies in final catalog of ~20 μ arcsecs (V=15 mag)**

- **Take a spectrum of ~150 million sources (RVS R=11,500 to V<17)**
- **Mission Goal: Make phase-space (r, v) map of the Galaxy to 1 Mpc**

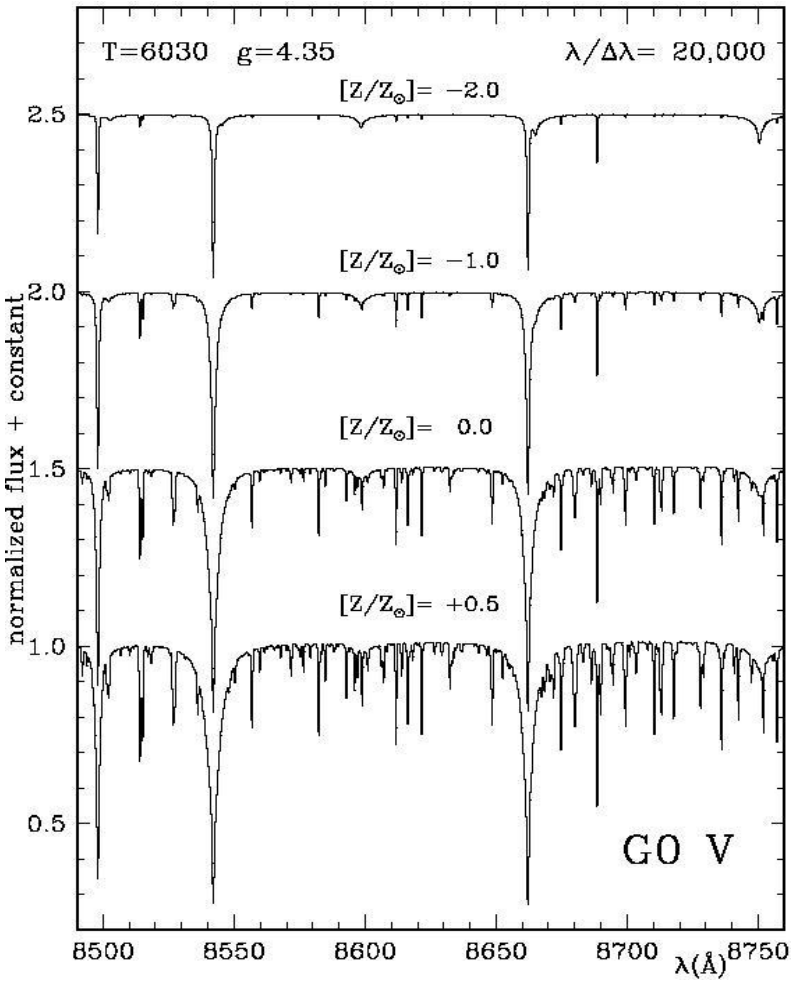
- **Science Goal: Unravelling the structure & formation of the Galaxy**
- **Scientific community produces detailed classification catalogue**

EXPECT THE UNEXPECTED ASTROPHYSICS

Spectral Sequences around Ca II IR triplet



Effect of temperature: A to M stars



Effect of metal abundance in G stars

Gaia Data Analysis

- **determination of atmospheric parameters:**
  T_{eff} , log g , [Fe/H] , [α/H] , A(λ) ,Vrot , Vrad, activity, etc.

- **combination with parallax to determine stellar parameters: L_*, R_*, (M_*, age)**

- **combine all available data (photometric, spectroscopic, & astrometric)**

Gaia Research Education Astronomy Training

Working Group B4: Stellar Atmospheres

Participants

Name	Inst	Contact	Comments
UlrikeHeiter	Uppsala University, Sweden	ulrike.heiter ... fysast.uu.se	**co-Facilitator**
Alex Lobel	Royal Observatory of Belgium	alex.lobel ... oma.be	**co-Facilitator**
Sofia Randich	INAF-Arcetri	randich ... arcetri.astro.it	
GeorgeSeabroke	MSSL, UCL, UK	gms ... mssl.ucl.ac.uk	
Indrek Kolka	Tartu Observatory	indrek ... aai.ee	
Carme Jordi	University of Barcelona	carme ... am.ub.es	
Jesús Maíz Apellániz	Instituto de Astrofisica de Andalucia-CSIC	jmaiz ... iaa.es	
Ronny Blomme	Royal Observatory of Belgium, Brussels	ronny.blomme ... oma.be	
Alessandro Lanzafame	University of Catania and INAF-OACt	Alessandro.Lanzafame ... oact.inaf.it	
Yves Frémat	Royal Observatory of Belgium, Brussels	yves.fremat ... oma.be	
CarolineSoubiran	LAB Bordeaux	soubiran ... obs.u-bordeaux1.fr	
CelineReyle	Obs Besancon	celine ... obs-besancon.fr	
Frédéric Thevenin	Observatoire de la Côte d'Azur, Nice	frederic.thevenin ... oca.eu	
Patrick de Laverny	Observatoire de la Côte d'Azur (Nice)	laverny ... oca.eu	
Alejandra Recio-Blanco	Observatoire de la Côte d'Azur (Nice)	arecio ... oca.eu	
Thomas Lebzelter	University of Vienna	lebzelter ... astro.univie.ac.at	
Rosanna Sordo	INAF - Padova Observatory	rosanna.sordo ... oapd.inaf.it	
Thierry Morel	Liege University, Belgium	morel ... astro.ulg.ac.be	
DavidMontes	UCM - Spain	dmg ... astrax.fis.ucm.es	
Andreas Korn	Uppsalla University, Sweden	andreas.korn ... fysast.uu.se	
Thomaž Zwitter	University of Ljubljana	tomaz.zwitter ... fmf.uni-lj.si	
Thibault Merle	Observatoire de la Côte d'Azur, Nice	Thibault.Merle ... oca.eu	
Eduard Masana	University of Barcelona	emasana ... am.ub.es	
Josep Manel Carrasco	University of Barcelona	carrasco ... am.ub.es	
Mathias Schultheis	Observatoire de Besancon	mathias ... obs-besancon.fr	
Sofia Feltzing	Lund Observatory	sofia ... astro.lu.se	
JonayGonzalez	IAC - Spain	jonay ... iac.es	
Norbert Przybilla	Observatory Bamberg, Germany	przybilla ... sternwarte.uni-erlangen.de	

30 participants
20 research inst.

Contact UH or AL to sign up

great.ast.cam.ac.uk/Greatwiki/WGB4StellarAtmospheres

CategoryWorkgroups

Discussion Session I

A 1: Do you think it is possible to define a standard format for (exchange of) model atmosphere data? How could we start to define such a standard? This would make comparisons and tests of different implementations of model physics and numerical approaches easier.

A 2: We computed 1-D MARCS models for AGB stars. Although we made a lot of assumptions (such as LTE, hydrostatic, homogeneous layers,...) far from reality, the synthetic spectra fit the observed spectra fairly well, and computed colors match very good to observed colors (both in the optical and infrared). Is this just a coincidence, or does this show that 1-D models suffice for the moment to compute atmospheric parameters for AGB stars ?

Discussion Session I

A 3: In coming years new 3-D hydrodynamic atmosphere model grids will become available. For example, in metal-poor cool stars Oxygen abundances can be substantially overestimated with 1-D models. Should we decide when to use 3-D instead of 1-D modelling for determining atmospheric parameters, also for Gaia data? Is it feasible for very large datasets, e.g. survey data?

A 4: How to define accuracy with which we determine atmospheric parameters? Should we make a clear distinction between internal and systematic errors? Systematic errors can be due to different modelling methods, LTE vs. NLTE, 1-D vs. multi-D, inaccurate or incomplete line lists, etc. Internal errors can result from differences in best fit methods, for example spectral synthesis fits vs. classical EW methods.