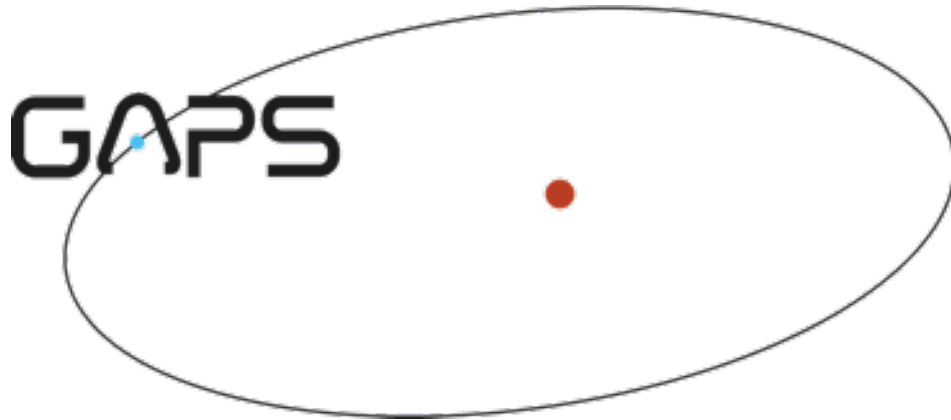


16th GAPS meeting

Monday, 4 May 2020 - Wednesday, 6 May 2020

Virtual meeting



Book of Abstracts

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Additional works / 2**The abundance signature of low-mass stars with planets.****Author:** Jesus Maldonado Prado¹¹ *Istituto Nazionale di Astrofisica (INAF)***Corresponding Author:** jesus.maldonado@inaf.it

Methods to derive in a consistent way stellar abundances of low-mass stars from optical spectra are still missing. In this contribution we present a first attempt to fill this gap. Our methodology is based on the use of principal component analysis and sparse Bayesian's fitting methods. A set of M dwarfs in binary systems orbiting around an FGK primary was observed and is used to training our methods. We use our results to test whether the correlations between the metallicity, individual chemical abundances, mass of the star and the presence of different type of planets found for FGK stars still holds for the less massive M dwarf stars.

Modelling and interpretation / 3**Understanding the XUV-induced Atmospheric Erosion of Young Planets and their Evolution With Time****Authors:** Darius Modirrousta Galian¹; Giuseppina Micela²; Daniele Locci²¹ *Istituto Nazionale di Astrofisica (INAF)*² *INAF-Osservatorio Astronomico di Palermo***Corresponding Authors:** dariusmodirroustagaliam@gmail.com, giuseppina.micela@inaf.it, daniele.locci@inaf.it

In the talk we will discuss the effects of X-ray and ultraviolet radiation on atmospheric erosion around young stars. Specifically, we focus on the bimodal distribution of exoplanet radii (i.e. "The Fulton Gap"; Fulton et al. 2017). In Modirrousta-Galian et al. (2020,b) this distribution is theoretically analysed in order to make several predictions that can be astronomically tested. For instance, a transition region from $1.75-2.00R_{\oplus}$ full of planets with and without hydrogen atmospheres is expected. Within this region a small peak in mega-Earths (telluric planets with masses greater than $10M_{\oplus}$) is also probable. These are the remnant cores of bodies which originally had much larger atmospheres but then lost them. Furthermore, whilst it cannot be currently verified, a potential mass distribution in exoplanets is shown. Finally, the dependence of the initial and present radius distributions on system parameters (i.e. equilibrium temperature, stellar temperature, and orbital distance) will be discussed.

GAPS Young / 4**YO38: validation study for TOI-942****Author:** Ilaria Carleo^{None}

Here we present a validation study for the TESS object of interest TOI-942. We performed a follow-up of this object with HARPS-N, collecting about 30 spectra. The HARPS-N spectra allow us to characterise the star and confirm the presence of the planet.

GAPS Young / 5

Update on V830 Tau/YO01

Author: Mario Damasso¹

¹ *INAF-OATo*

I will present the results for V830 Tau after the third observing season with HARPS-N came to an end. The talk will be structured following the emerging structure of the draft in preparation, highlighting the concept and the main points to be addressed in the publication.

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Status programma Young Objects

Authors: Serena Benatti¹; Silvano Desidera²

¹ *Istituto Nazionale di Astrofisica (INAF)*

² *INAF OAPd*

Corresponding Authors: serena.benatti@inaf.it, silvano.desidera@oapd.inaf.it

Sommario delle osservazioni, del campione stellare e delle attività del programma Young Objects, inclusa la definizione delle criticità rilevate.

GAPS Special Objects / 7

Special Objects - aggiornamento M109 + M112

Author: Domenico Barbato^{None}

I will provide an update on M109 and M112

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Special Objects - aggiornamento M112

Author: Matteo Pinamonti^{None}

I will provide an update on M112

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Special Objects - aggiornamento M108

Author: Matteo Pinamonti^{None}

I will provide an update on M108

GAPS Special Objects / 10**Special Objects - aggiornamento nane M GAPS1****Author:** Laura Affer^{None}

I will provide an update on the old GAPS1 M dwarfs followed as special objects

GAPS Special Objects / 11**Special Objects - overview del programma****Author:** Alessandro Sozzetti^{None}

I will summarize the status of the special objects program

GAPS Special Objects / 12**Special Objects - Discussione e Prospettive****Author:** Alessandro Sozzetti^{None}

Discuteremo dello stato del programma e delle prospettive di evoluzione

General Session / 13**GAPS1 - What's left?****Author:** Alessandro Sozzetti^{None}

Breve discussione di analisi dei programmi GAPS1 ancora pendenti.

GAPS Atmospheres / 15**Introduction****Authors:** Aldo Stefano Bonomo¹; Valerio Nascimbeni²

¹ *Istituto Nazionale di Astrofisica (INAF)*

² *INAF-OAPD*

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A general introduction about the current state of the VIS/NIR observations and analysis, and the future prospects

GAPS Atmospheres / 16

Atmospheric RML effect of KELT-20b

Author: Monica Rainer¹

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Atmospheric RML effect of KELT-20b

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Update on the VIS analysis with SLOppy

Author: Daniela Sicilia¹

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Update on the VIS analysis with SLOppy

GAPS Atmospheres / 18

Reflected light from 51 Peg b

Author: Gaetano Scandariato¹

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Corresponding Author: gaetano.scandariato@inaf.it

Reflected light from 51 Peg b

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H-alpha absorption on WASP-33b

Author: Francesco Borsa¹

¹ *Istituto Nazionale di Astrofisica (INAF)*

Corresponding Author: francesco.borsa@inaf.it

H-alpha absorption on WASP-33b

GAPS Atmospheres / 20

The unexpected chemistry of HD209458

Author: Paolo Giacobbe¹

¹ *Istituto Nazionale di Astrofisica (INAF)*

Corresponding Author: paologiacobbe85@gmail.com

By performing high-resolution transmission spectroscopy with GIANO-B over the whole near-infrared, we measured the signature of seven molecular species via cross correlation with model spectra.

GAPS Atmospheres / 21

Disequilibrium chemistry in the atmospheres of the three warm giant planets WASP-69 b, WASP-107b and WASP-80b

Author: Gloria Guilluy¹

¹ *Istituto Nazionale di Astrofisica (INAF)*

Corresponding Author: gloria.guilluy@inaf.it

Here we report preliminary results of the atmospheric studies we performed on the three warm giant planets, Wasp-69b, Wasp-107b and Wasp-80b. By using the PCA technique, and the cross-correlation method, we succeeded in detecting 7 molecules in these exo-atmospheres. Given the low temperature of the investigated exoplanets, some of these molecules are un-expected by equilibrium theories, we have thus to bring up the disequilibrium chemistry to explain our finding.

Modelling and interpretation / 22

Modelling exoplanet atmospheres to interpret GIANO observations

Author: Matteo Brogi¹

¹ *University of Warwick*

Corresponding Author: matbrogi@gmail.com

Near-infrared high-resolution spectroscopy relies on cross correlation with model spectra to extract information about the chemical and physical conditions of exoplanet atmospheres. In this talk I will review recent efforts to identify the most reliable molecular line lists applicable to simulate the high temperatures of extrasolar planets. Furthermore, I will explain how GIANO could be used to detect transmission spectra of cloudy exoplanets and distinguish cloudy atmospheres from atmospheres with a high metallicity, currently challenging at low spectral resolution.

Additional works / 23

Atmospheric parameters and chemical composition of YO stars

Author: Martina Baratella¹

¹ *Università degli studi di Padova*

Corresponding Author: martina.baratella.1@phd.unipd.it

The detailed characterisation of stars is important in many astrophysical fields. In particular, knowing with great precision the atmospheric parameters and chemical composition of planet hosting stars allows to fully characterise exoplanets and address a number of aspects, e.g. the planet-metallicity relation.

In our work, we performed a precise determination of the atmospheric parameters and a detailed chemical analysis of high-resolution spectra of stars observed by the GAPS consortium. The selected targets are intermediate-age stars (< 700 Myr), that have been observed simultaneously in the optical with HARPS-N and in the near infrared with GIANO-B spectrographs at TNG, in GIARPS mode. We analysed the spectra by applying a new method, that exploits the use of titanium lines to derive the atmospheric parameters, in particular surface gravities and microturbulence velocity parameter. The resulting parameters have been used to derive the abundances in the optical and NIR spectra through equivalent width and spectral synthesis methods, respectively. We derived abundances for eleven atomic species: C I, Na I, Mg I, Al I, Si I, Ca I, Ti I, Ti II, Cr I, Cr II, Fe I, Fe II, Ni I and Zn I. Our spectroscopic determination of the atmospheric parameters are in excellent agreement with the initial photometric guesses. We also found a good agreement between the optical and NIR abundances, with all stars having close-to-solar metallicities. The lack of systematic trends between elemental abundances and effective temperatures validates our methods. However, we observed that the coolest stars in the sample, with $T < 5400$ K, display higher abundances for the ionised species, in particular Cr II, and for high-excitation potential C I lines. On the contrary, carbon abundances derived from CH molecular band at 4300 Å, do not display the same behaviour as the optical C I estimates.

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Exoplanets at TNG

Author: Ennio Poretti¹

¹ *Istituto Nazionale di Astrofisica (INAF)*

Corresponding Author: ennio.poretti@brera.inaf.it

The status of the programs on the exoplanets at TNG will be reviewed, with a particular emphasis on the current difficult situation.

General Session / 25

Report delle osservazioni di GAPS2.0

Authors: Riccardo Claudi^{None}; Andrea Bignamini¹

¹ *INAF Osservatorio Astrofisico di Trieste*

Corresponding Author: riccardo.claudi@inaf.it

In questo contributo sono riportate le statistiche delle notti di osservazione dall'inizio del long program GAPS2.0. In particolare, vengono mostrate le statistiche relative al run AOT40 (appena finito) e quelle relative al run AOT41 (appena cominciato).

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Transiting Planet Host Activity 2

Author: Riccardo Claudi^{None}

Corresponding Author: riccardo.claudi@inaf.it

In questo contributo è presentato lo stato dello studio dell'attività delle stelle ospite di pianeti transitanti. Sono trattati sistemi osservati durante GAPS1.0 e confrontati con altri sistemi transitanti e stelle di campo.

GAPS Young / 27

Status dello studio del sistema YO36

Authors: Riccardo Claudi^{None}; Mario Damasso¹

¹ *INAF - Osservatorio Astrofisico di Torino*

Corresponding Author: riccardo.claudi@inaf.it

YO36 è una stella giovane attorno nella curva di luce K2 della quale sono stati osservati i transiti di quattro oggetti diversi. La stella è molto attiva e le misure di Velocità Radiale ottenute fin'ora non sembrano mostrare segnali kepleriani.

GAPS Young / 28

Status of YO analysis

Author: Luca Malavolta¹

¹ *Università degli Studi di Padova*

Corresponding Author: luca.malavolta@unipd.it

I'll give a brief summary of the status of the analysis of the Young Object target YO14

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RV follow-up prediction

Corresponding Author: serena.benatti@inaf.it

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Discussion

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Updates on HARPS-N

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nuova WBS e PMP

Corresponding Author: antonio.maggio@inaf.it

GAPS Young / 33

Discussion

Modelling and interpretation / 34

Evaporation models and the importance of determining the parameters of young planets

The knowledge of planetary mass and radius of young planets is crucial in the understanding if their atmospheres can survive at the intense XUV stellar irradiation

Perspectives and synergies / 35

Special objects: discussion and perspectives

Corresponding Author: alessandro.sozzetti@inaf.it

Perspectives and synergies / 36

Coordinations with GTO and TFOP

Corresponding Author: alessandro.sozzetti@inaf.it

Perspectives and synergies / 37

GAPS –CHEOPS Synergies

Corresponding Author: giampaolo.piotto@unipd.it

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Discussion

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Wavelength calibration for GIANO-B spectra

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GAPS1-HADES

Corresponding Author: matteo.pinamonti@inaf.it

Updates/results from GAPS1-HADES

Additional works / 41

Correcting the impact of stellar spots on ARIEL transmission spectra

In my study, I analyze the impact of stellar spots on ARIEL observations and their effects on the extraction of the planetary signal from primary transit observations. I develop a method to determine the size and temperature of the spots by using the out-of-transit observations and I define a procedure to reliably extract the planetary spectrum in the presence of spots.