Stefano Bellotti

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https://sbellotti.github.io/index.html

Current position

2020 - present	Ph.D. student at the Institut de Recherche en Astrophysique et Planétologie (IRAP), Université Toulouse III - Paul Sabatier, Toulouse, France Title: "Searching new worlds with SPIRou: tackling stellar activity" Supervisors: Pascal Petit (IRAP), Julien Morin (LUPM), Gaitee Hussain (ESTEC-ESA)
2022 - present	Visiting trainee researcher at European Science and Technology Research Centre (ESTEC-ESA).

Education

2017 - 2019	MSc in Astrophysics, Niels Böhr Institute, University of Copenhagen, Denmark.
2013 - 2017	BSc in Physics, Physics Department, University of Pavia, Italy.

Skills

Python	Upper intermediate: cluster usage and astronomical packages (AstroPy, PyRAF, Pyfits, Astroquery)
Languages	Italian (native), English (fluent), and French (B1 level)

Observing experience and proposals

PI of six telescope proposals totaling 235 hours of observing time over semester 2021A, 2021B, 2022B, 2023A for the following instruments: ESPaDOnS and SPIRou@Canada-Hawaii-France Telescope, Narval and Neo-Narval@ Telescope Bernard-Lyot, and HARPS-Pol@ESO 3.6-m

Nov 2021	Visitor mode operation for eight nights at Telescope Bernard-Lyot.
Aug 2018	MSc course "Observational Astronomy": observing, data reduction with IRAF and analysis for seven nights at Nordic Optical Telescope, La Palma, Spain.

Conference participation

Feb 2023	Talk at the STScI Exoplanets, Star and Planet Formation Seminar Series (ESPF), with the title: "*Is AD Leo featuring a polarity reversal of the large-scale magnetic field? Long-term monitoring across near-infrared and optical domains with SPIRou, ESPaDOnS and NARVAL*".
Aug 2022	Talk at the IAU General Assembly 2022, Busan, South Korea, with the title: "*Near-infrared long-term monitoring of AD Leo with SPIRou: towards a magnetic polarity reversal?*".
Jun 2022	Talk at the Lorentz workshop 'Life Around a Radio Star', Leiden, Netherlands, with the title: "*Magnetic fields of M dwarfs and stellar activity filtering techniques*".
Jun 2022	Talk and proceedings contribution to the ESO Hypatia Colloquia 2022 edition, online, with the title: "*Mitigating stellar activity using line selections for Least-Squares Deconvolution*".
Aug 2020	Talk at the Lunar and Planetary Laboratory Conference, Tucson, Arizona, US (held online) with the title: "*Detecting Extrasolar Planets Using Eclipsing Binaries as Natural Starshades*".
Jul 2022	Poster presentation at the CoolStars21 conference, Toulouse, France, with the title: "*Is AD Leo entering a polarity reversal? Long-term monitoring of the large-scale magnetic field with ESPaDOnS, NARVAL and SPIRou*".
May 2022	Poster presentation at the EXOPLANET IV conference, Las Vegas, US, with the title: "*Mitigating stellar activity jitter with a parametric and a randomised line selection for least-squares deconvolution*".
Oct 2021	Poster presentation at the Star-Planet Connection online conference with the title: "*Simulating starspot activity jitter for spectral types F–M: realistic estimates for a representative sample of known exoplanet hosts*".
May 2019	Poster presentation at the Annual Danish Astronomy Meeting, Nyborg, Denmark with the title: "*Hunting exoplanets: detection limits due to starspots*".

Scientific formation work

Feb 2022 - Present	LOC member for the Planet ESLAB 2023 symposium to be held at ESA-ESTEC, Noordwijk, The Netherlands.
Apr 2022	Co-chair of the Holland-Area Exoplanet Science Meeting (HAESM), held in hybrid format at ESTEC-ESA, Noordwijk, Netherlands.
Dec 2020 - May 2021	Member of the organizing team of the "Ph.D. Day 2021": a one-day event dedicated to Ph.D. students to showcase their research and foster collaborations. Held online, Toulouse, France.
Sep 2020 - Dec 2020	Member of the editing team of the "*Newcomer's guide at IRAP*": a problem-solving document to describe all aspects of the Ph.D. student's life at IRAP, Toulouse, France.

Publications

Refereed

Bellotti S., Vidotto A., Fares R., et al., "*The large-scale magnetic field and stellar wind environment of the exoplanet host M dwarf GJ 436*", Astronomy & Astrophysics, in prep.
I reconstructed the large-scale field of the GJ 436 from optical archival spectropolarimetric observations that are the inputs of the 3D MHD wind simulations.

Bellotti S., Morin J., Lehmann L., et al., "*Monitoring the magnetic field of AD~Leo with SPIRou, ESPaDOnS and NARVAL: Towards a magnetic polarity reversal?*", Astronomy & Astrophysics, in prep. (planned submission by February 2023).
I reconstructed the large-scale field of AD Leo from near-infrared SPIRou observations obtained under the SPIRou Legacy Survey, tracked the evolution of longitudinal field, FWHM of Stokes I, collected the results of both PCA and Zeeman broadening.

Fouque P., +4 others, **Bellotti** S., +18 others "*The SPIRou Legacy Survey. Rotation period of quiet M dwarfs from circular polarization in near-infrared spectral lines: I. The SPIRou APERO analysis*", Astronomy & Astrophysics, in prep.
I performed complementary tests to measure stellar rotation periods by using a diffferent recipe to perform Least-Squares Deconvolution, Longitudinal field estimation, and Gaussian Process Regression.

Carmona A., Delfosse X., **Bellotti** S., +36 others "*Near-IR and optical radial velocities of the active M-dwarf star Gl~388 (AD~Leo) with SPIRou at CFHT and SOPHIE at OHP: A 2.23 days rotation period and no evidence for a co-rotating planet*", Astronomy & Astrophysics, submitted
I computed longitudinal field values and performed a periodogram analysis to further support the claim that P = 2.23 d is only the stellar rotation period.

Cortes-Zuleta P., +10 others, **Bellotti** S., +7 others, "*Optical and near-infrared stellar activity characterization of the early M dwarf Gl 205 with SOPHIE and SPIRou*", Atronomy & Astrophysics, submitted
I discovered and fixed a problem with the polarimetric analysis pipeline, which was resulting in weaker magnetic fields by a factor of two.

Martioli E., +5 others, **Bellotti** S., +53 others, "*TOI-1759 b: a transiting sub-Neptune around a low mass star characterized with SPIRou*", Astronomy & Astrophysics, 660, A86.
I performed the magnetic field reconstruction of TOI-1759 by means of Zeeman-Doppler Imaging using APERO data.

Bellotti S., Petit P., Morin J., et al., "*Mitigating stellar activity jitter with different masks for least-squares deconvolution: Analysis of a parametric and a randomised line selection*", 2022, Astronomy & Astrophysics, 657, A107.
I performed the parametric selection of lines, developed the randomised algorithm and testes its applicability under different conditions and on various data sets (distinct epoch, star, or with the presence of a synthetic planet).

Bellotti S. and Korhonen H. "*Simulating starspot activity jitter: realistic estimates for a representative sample of known F--M exoplanet hosts*", 2021, Astronomische Nachrichten, 342:926-940.
I performed the target selection among the known exoplanet host stars with available magnetic activity information. I scoured the literature in search of stellar parameteres for the simulations, then analysed the output of the simulations and presented the results.

Bellotti S., Zabludoff A., Belikov R., Guyon O., Rathi C. "*Detecting Exoplanets Using Eclipsing Binaries as Natural Starshades*", 2020, The Astronomical Journal, 160, 131.
I scoured the literature seeking suitable eclipsing binary targets on which to test the idea. I estimated the feasibility of the methodology for both the self-luminous and reflected light planets.

Non-Refereed

Stritzinger, +4 others, **Bellotti**, +4 others, 2018, "Transient Classification Report for 2018-08-16".
I was part of the observers team that classified the object.

Fynbo, Ardevol Martinez, **Bellotti**, +3 others, 2018, "Transient Classification Report for 2018-08-30".
I was part of the observers team that classified the object.