Sylvain N. Breton

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Research experience

2019–current - **CEA Saclay/Université de Paris**, *Gif-sur-Yvette, France*
PhD student in stellar physics, helio- and asteroseismology.
Low-frequency modes study in the Sun and solar-like stars.
Supervisors: Dr. Rafael A. García (CEA), Dr. Pere L. Pallé (IAC), Dr. Allan Sacha Brun (CEA)

> Data analysis on *Kepler*/K2, GOLF and Solar-SONG data. Peakbagging for solar and stellar power spectra. F-type stars 3D-hydrodynamical deep-shell simulations with the ASH code. I am a member of the LDE3 team (http://irfu.cea.fr/dap/LDEE/index.php) team and I work in regular partnership with researchers from the Tenerife IAC (Spain).

2019 - **Research internship (4 months)**, CEA Saclay, *Gif-sur-Yvette, France*
Supervisors: Dr. Rafael A. García (CEA), Dr Savita Mathur (IAC), Dr. Pere L. Pallé (IAC)

> Helio- and asteroseimology in partnership with the Tenerife IAC (11-week visit at IAC). Study of the SoHO-GOLF instrument timing issues and machine learning for main-sequence solar-like stars surface rotation study.

2018 - **Research internship (5 months)**, CEA Saclay, *Gif-sur-Yvette, France*,
Supervisors: Dr. Emeline Bolmont (CEA), Dr. Stéphane Mathis (CEA)

> Study of the influence of tides inside compact telluric exoplanetary systems.

Education

2015–2019 - **École polytechnique**, *Palaiseau, France*
Ingénieur polytechnicien degree. Physics, Informatics.

- 2018–2019 : **Université Paris-Diderot, Observatoire de Paris**, *Paris, France*
  MSc *Astronomy, astrophysics and space engineering: gravitational systems dynamics*.
- 2016-2017 : **Université Paris-Nanterre**, *Nanterre, France*
  Bachelor of Philosophy.

2013–2015 - **Lycée Montaigne**, *Bordeaux, France*
Classes préparatoires, filière PCSI/PC.

2013 - ***Baccalauréat, mention Très bien***

PAPERS

Refereed:

1. **Breton S.N.**, Santos A.R.G., Bugnet L., Mathur S., García R.A., Pallé P.L., **ROOSTER: a machine-learning analysis tool for *Kepler* stellar rotation periods**, A&A, 2021, 647, A125.

2. Santos A.R.G., **Breton S.N.**, Mathur S., García R.A., **Surface rotation and photometric activity for *Kepler* targets. II. G and F main-sequence stars, and cool subgiant stars**, ApJ, 2021, 255, 17.

3. Bolmont E., **Breton S.N.**, Tobie G., Dumoulin C., Mathis S., Grasset O., **Solid tides in multi-layer planets: Application to Earth, Venus, a Super Earth and the TRAPPIST-1 planets**, A&A, 2020, 644, A165.

4. Corsaro E., Bonnano A., Mathur S., García R.A., Santos A.R.G., **Breton S.N.**, **A calibration of the Rossby number from asteroseismology**, A&A, 2021, 652, L2.

5. Mathur S., García R.A., Santos A.R.G. **Breton S.N.**, Huber D., Mosser B., Sayeed M., Bugnet L., **New detections of solar-like oscillations in 58 survey phase targets of the *Kepler* mission**, A&A, 2021, in press.

6. Hill M.L., Kane S.R., Campante T.L., Li Z., Dalba P.A., Brandt T.D., White T.R., Pope B. J.S., Stassun K.G., Fulton B.J., Corsaro E., Li T., Ong J.M.J., Bedding T.R., Bossini D., Buzasi D.L., Chaplin W.J., Cunha M.S., Garcia R.A., **Breton S.N.**, Hon M., Huber D., Jiang C., Kayhan C., Kuszlewicz J.S., Mathur S., Serenelli A., Stello D., **Asteroseismology of iota Draconis and Discovery of an Additional Long-Period Companion**, AJ, 2021, in press.

7. **Breton S.N.**, Pallé P.L., García R.A., Fredslund Andersen M., Grundahl F., Christensen-Dalsgaard J., Kjeldsen H., Mathur S., **No swan song for Sun-as-a-star helioseismology: performances of Solar-SONG for individual mode characterisation**, submitted to A&A.

8. Smith A.M.S., **Breton S.N.**, Csizmadia Sz., Dai F., Gandolfi D., García R.A., Howard W., Isaacson H., Korth J., Lam K.W.F., Mathur S., Nowak G., Pérez Hernández F., Persson C.M., Albrecht S.H., Barragán O., Cabrera J., Cochran W.D., Deeg H.J., Fridlund M., Georgieva I.Y., Goffo E., Guenther E.W., Hatzes A.P., Livingston J.H., Luque R., Palle E., Redfield S., Serrano L.M., Van Eylen V., **K2-99 revisited: a non-inflated warm Jupiter, and a temperate giantplanet on a 523-d orbit around a subgiant**, submitted to MNRAS.

9. Huber D., White T.R., Metcalfe T.S., Chontos A., Fausnaugh M.M., Ho C.S.K., Van Eylen V., Ball W., Basu S., Bedding T.R., Benomar O., Bossini D., **Breton S.N.**, Buzasi D. L., Campante T.L., Chaplin W.J., Christensen-Dalsgaard J., Cunha M.S., Deal M., Garcia R.A., Garcia Munoz A., Gehan C., Gonzalez-Cuesta L., Jiang C., Kayhan C., Kjeldsen H., Lundkvist M.S., Mathis S., Mathur S., Monteiro M.J.P.F.G., Nsamba B., Ong J.M.J., Pakstiene E., Serenelli A.M., Silva Aguirre V., Stassun K.G., Stello D., NorgaardStilling S., Lykke Winther M., Wu T., Barclay T., Daylan T., Guenther M.N., Hermes J.J., Jenkins J.M., Latham D.W.,Levine A.M., Ricker G.R., Seager S., Shporer A., Twicken J.D., Vanderspek R.K., Winn J.N., **A 20-Second Cadence View of Solar-Type Stars and Their Planets with TESS: Asteroseismology of Solar Analogs and a Re-characterization of π Men c**, submitted to ApJ.

Non refereed:

- **Breton S.N.**, Santos A.R.G., Mathur S., García R.A., Bugnet L., Pallé P.L., **Analysing *Kepler* stellar surface rotation and activity with ROOSTER**, proceeding French Society of Astronomy and Astrophysics (SF2A), 2021.

- **Breton S.N.**, García, R. A., Pallé, P. L., Mathur, S., Hill, F., Jain, K., Jiménez, A., Tripathy, S. C., Grundahl, F., Fredslund-Andersen, M., Santos, A. R. G., **A Comparison of Global Helioseismic-Instrument Performances: Solar-SONG, GOLF and VIRGO**, proceeding Dynamics of the Sun and Stars, Springer 2020.
- **Breton S.N.**, Bugnet L., Santos A.R.G., Le Saux A., Mathur S., Pallé P.L., García R.A., **Determining surface rotation periods of solar-like stars observed by the *Kepler* mission using machine learning techniques**, proceeding SF2A, 2019.
- **Breton S.N.**, Bolmont E., Tobie G., Mathis S., Grasset O., **Tidal heating in multilayer planets: Application to the TRAPPIST-1 system**, proceeding SF2A, 2018.
- Le Saux A., Bugnet L., Mathur S., **Breton S.N.**, García R.A., **Automatic classification of K2 pulsating stars using machine learning techniques**, proceeding SF2A, 2019.

Teaching

2020-2021 - Teaching assistant at Université de Paris: Physics Practical Works (48h), Informatics for all (36h), Fluid Mechanics Practical Works (9h).
2019-2021 - Co-supervision of a Centrale-Supelec undergraduate student research project (V. Delsanti).

Talks and seminars

Upcoming 2021 (November 17h) - Good vibration seminar - *Characterising rotation from the core to the surface in solar-like main-sequence stars.*
2021 - French astronomy society (SF2A) week - *Analysing Kepler stellar surface rotation and activity with ROOSTER*
2021 - WholeSun ERC meeting - *3D-hydrodynamical deep-shell simulation of a F-type star with the ASH code.*
2020 - Iberian meeting - *Stellar surface rotation analysis in Kepler with ROOSTER.*
2020 - Exosystèmes - *Hands-on for asteroseismology.*
2019 - IAC SSEBE group seminar - *Machine learning for surface rotation and helioseismology with GOLF and Solar-SONG*.

Scientific software

- I have several public projects related to stellar physics and data analysis (mainly written in `Python` hosted on GitLab: `https://gitlab.com/sybreton`.
- I have created and I actively develop the `apollinaire` peakbagging library (Breton et al. in prep) which provides MCMC tools for asteroseismical parameters extraction in power spectra. (`https://gitlab.com/sybreton/apollinaire`).

Languages – French, English, Russian, Spanish.