



## RadioNet support for Short Term Missions Application form

STM INFORMATION	
APPLICANT'S NAME	Pablo García Carreño
APPLICANT'S AFFILIATION	PhD Student in Yebes Observatory (UAH-IGN, Spain)
HOST INSTITUTE	INAF – Institute of Radio Astronomy, via Pier Gobetti, 101 – Bologna, Italy. Contact person: Sergio Mariotti, <a href="mailto:s.mariotti@ira.inaf.it">s.mariotti@ira.inaf.it</a> , + 39 051 6399356
DATE OF THE STM	13/03/2017 - 31/03/2017
TOTAL COST OF STM	1.500 €
OTHER SOURCES OF FUNDING	IGN
<b>Request</b> (max. 2,5 pages)	
Topic	<p>Development of high temperature superconducting (HTS) filters for radio frequency interference (RFI) mitigation.</p> <p>The increase of RFI signals deteriorate the performance of high sensitivity radio astronomy receivers saturating low noise amplifier, for this reason, it is very important for the radio astronomy community to mitigate their effects in the observations.</p> <p>H2020 Radionet4 project plans to build a prototype broad-band VLBI receiver in the range 1.5 - 15.5 GHz, the performance of this receiver will be distorted by RFI signals due to different services, like WiFi, UMTS, Bluetooth, WiMax... whose working frequencies are inside of operating band of this receiver. Therefore, it's necessary to build HTS filters to minimize RFI impact of it.</p>
Proposed work	Assembly and characterization of HTS filters for interference mitigation. A first prototype of filter has been designed and manufactured on superconducting substrate. The scope of the work in this mission includes the careful integration of the prototype in its gold-plated titanium carrier together with its interface connectors and the preliminary tests to verify its performance.
Cross-disciplinary	The mission will allow young a PhD student to learn the HTS filter technology developed by INAF in order to apply it the radio astronomy receivers of the Spanish Yebes Observatory. These works could be the seed for a thesis on this topic.
Impact	<p>The impact of radio frequency interference (RFI) on astronomical and geodetic observations is one of the major problems in all observatories around the world.</p> <p>The existence of RFI can damage the amplifying stages of ultra low noise receivers or drive them into saturation and, hence, generate intermodulation. These effects impede the detection of cosmic radio signals or even blind the receiver, making it useless. Therefore, it is very important develop mitigation techniques, like HTS filter, to avoid unwanted effects on sensitive receivers.</p> <p>The results of the works on HTS could be used by industry for similar applications demanding ultra-low insertion loss filters and high rejection of interference signals, like future mobile communication services or space-to-Earth</p>

	communications of satellites and deep-space probes.
<b>Curriculum Vitae</b>	<p>Master's degree in Telecommunication Engineering. University of Alcala.</p> <p>Bachelor's degree in Telecommunication system Engineering. University of Alcala.</p> <p>Experience Skills.</p> <ul style="list-style-type: none"> <li>• Design and construction broadband UP/DOWN converters (2-14 GHz).</li> <li>• Programming of control system for receivers.</li> <li>• Noise measurements of receivers.</li> <li>• RFI measurements.</li> <li>• Radio astronomy basics.</li> <li>• Electromagnetic simulation: CST, Genesys, ADS.</li> </ul> <p>Experience with measurement instrumentation:</p> <ul style="list-style-type: none"> <li>• Spectrum Analyzer.</li> <li>• Vector Network Analyzer.</li> <li>• Oscilloscope.</li> </ul> <p>International Publications:</p> <ul style="list-style-type: none"> <li>- García-Carreño, P., García-Álvaro, S., López-Pérez, J. A., Patino-Esteban, M., Serna, J. M, López-Fernández, J. A. (2016, October). "Geodetic VLBI ultra low noise broad-band receiver for 13 meter VGOS radiotelescopes". In Microwave Integrated Circuits Conference (EuMIC), 2016 11th European (pp. 476-479). IEEE.</li> <li>- Patino-Esteban, M., López-Pérez, J. A., García-Carreño, P. , García-Álvaro, S., López-Fernández, J. A. "Wideband IF Signal Processor for Microwave Spectroscopy in Radio Astronomy". Submitted to European Microwave Week (EUMW), 2017. IEEE.</li> <li>- García-Álvaro, S., López-Pérez, J. A., Patino-Esteban, M., García-Carreño, P., López-Fernández, J. A. "W-band Frequency Converters for Wideband Microwave Spectroscopy in Radioastronomy". Submitted to European Microwave Week (EUMW), 2017. IEEE.</li> </ul> <p>National Publications</p> <ul style="list-style-type: none"> <li>- García-Carreño, P., López-Pérez, J. A., Patino-Esteban, M., Serna, J. M, López-Fernández, J. A. . (2016, September). "Receptor de banda ancha para el radiotelescopio de 13.2 metros del Observatorio de Yebes." XXXI Simposium Nacional de la Unión Científica Internacional de Radio, URSI 2016.</li> </ul>

**Name:** Pablo García Carreño

**Date of birth:** 30/07/1992

**Phones:** +34646432646; +34918868150

**Address:** C/ Los Ángeles 36, Torres de la Alameda, Madrid, Spain

**Email:** pablo.garcia@oan.es

### Training:

- **2015-2016 Master's Degree Telecommunications Engineering.**  
University of Alcalá de Henares (Spain).
- **2010-2014 Bachelor's Degree Telecommunications Systems Engineering.**  
University of Alcalá de Henares (Spain).
  - o First year: 8.75/10
  - o Second year: 8.55/10
  - o Third year: 8.41/10
  - o Fourth year: 9.29/10
  - o 3 subjects with honors.
  - o Final work: 10.
  - o Final grade: 8,75/10

### Awards:

- **Madrid Community Excellence Scholarship, 2012.** Free competitive grant of Madrid Community Universities for excellence academic records.
- **Colaboration grant from Education, Culture and Sport Ministry of Spain** in Communication and Signal Department from University of Alcalá de Henares. Free competitive national grant for initiation to research. Duration: 8 month.



### Other courses:

- 2013** CST Microwave Studio seminar, University of Alcala de Henares (8 Hour).
- 2013-2014** English's courses, British Council levels B1 y B2.1 (*Intermediate y Upper Intermediate*)
- 2015** Certification of Completion Vector Network Analysis and Spectrum Analysis Training for KEYSIGHT

### Languages:

- Spanish (native), English (Good Reading and writing skills).

### Professional experience:

- **2013- 2014 Colaboration grant in Communication and Signal Department from University of Alcalá de Henares.** Duration: 8 month
- **2014-2015 Research grant:** "Development of control and monitoring system for the S/X receivers of Wettzell and Ohiggins geodetic stations". Radiation and Sensing research department, University of Alcalá. Duration: 12 months.
- **2015-2019 Instituto Geografico Nacional grant** for the development of radioastronomical receivers. Started on September 2015.

### Experince Skills.

- o Design and construction broadband UP/DOWN converter (2-14 GHz).
- o Programming of control system for receivers.
- o Design and construction down converter in S, X band.
- o Noise measurements of receivers.
- o RFI measurements.
- o Radioastronomy basics.
- o Electromagnetic simulation: CST, Genesys, ADS.

- Experience with measurement instrumentation:
  - Spectrum Analyzer.
  - Vector Network Analyzer.
  - Oscilloscope.

## Computer Skills.

- Programming: C, Java, Python
- Matlab, Pspice, Orcad, Cadstar, AutoCad.
- Good knowledge of Windows and Microsoft Office

## Participation and attending to congresses:

- **European Microwave Week, London 2016, EuMW 2016.**
  - García-Carreño, P., García-Álvaro, S., López-Pérez, J. A., Patino-Esteban, M., Serna, J. M, López-Fernández, J. A. (2016, October). *“Geodetic VLBI ultra low noise broad-band receiver for 13 meter VGOS radiotelescopes”*. In Microwave Integrated Circuits Conference (EuMIC), 2016 11th European (pp. 476-479). IEEE
- **European Microwave Week, Nuremberg 2017, EuMW 2017**
  - Patino-Esteban, M., López-Pérez, J. A., García-Carreño, P. , García-Álvaro, S., López-Fernández, J. A. *“Wideband IF Signal Processor for Microwave Spectroscopy in Radio Astronomy”*. Submitted to European Microwave Week (EUMW), 2017. IEEE.
  - García-Álvaro, S., López-Pérez, J. A., Patino-Esteban, M., García-Carreño, P., López-Fernández, J. A. *“ W-band Frequency Converters for Wideband Microwave Spectroscopy in Radioastronomy”*. Submitted to European Microwave Week (EUMW), 2017. IEEE.
- **XXXI Simposium Nacional de la Unión Científica Internacional de Radio, URSI 2016.**
  - García-Carreño, P., López-Pérez, J. A., Patino-Esteban, M., Serna, J. M, López-Fernández, J. A. . (2016, September). *“Receptor de banda ancha para el radiotelescopio de 13.2 metros del Observatorio de Yebes.”*. XXXI Simposium Nacional de la Unión Científica Internacional de Radio, URSI 2016.

## Other information

- Availability to travel.
- License of car.

Bologna, Feb. 14, 2017

To: Dr. Pablo Garcia – Centro Astronomico de Yebes, Dir. Gral. Instituto Geografico Nacional.

**Invitation Letter**

Dear Pablo,

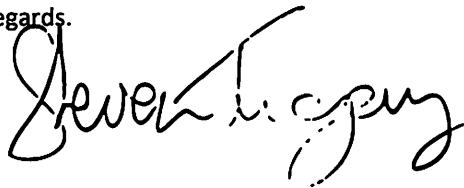
In order to continue and increase the scientific collaboration between you and Sergio Mariotti on microwave components, I would like to invite you to spend two/three weeks in March/April 2017 at the INAF – Institute of Radio Astronomy, via Pier Gobetti, 101 – Bologna, Italy.

Working closely would be an excellent opportunity to deal with the electromagnetic topics connected to design/fabrication/characterization of microwave High Temperature Superconductor filters to be installed in radio astronomical cryogenic front-ends.

In this period, you will have the opportunity to work, also in collaboration with Pietro Bolli of the Arcetri Astrophysical Observatory, on the assembling and characterization of the following HTS filters: the C-low band for SRT and the S-band for Yebes.

The collaboration will be free of charge from both sides.

Best regards.

A handwritten signature in black ink, reading "Steven T. Guy". The signature is written in a cursive, flowing style with a large initial 'S'.