



## RadioNet support for Short Term Missions Application form

STM INFORMATION	
APPLICANT 'S NAME	Sonia García Álvaro
APPLICANT'S AFFILIATION	Fellow in Yebes Observatory (UAH-IGN, Spain)
HOST INSTITUTE	<p><i>IRAM, Institute de Radioastronomie Millimetrique</i> <i>300 Rue de la Piscine</i> <i>38400 Saint-Martin d'Hères, France</i> <i>e-mail: <a href="mailto:schuster@iram.fr">schuster@iram.fr</a></i></p> <p>Asunto: Fwd: Fwd: papeles RadioNet Fecha: 2017-06-29 14:54 De: Karl Schuster &lt;<a href="mailto:schuster@iram.fr">schuster@iram.fr</a>&gt; Destinatario: José Antonio López Fernández &lt;<a href="mailto:ja.lopez@oan.es">ja.lopez@oan.es</a>&gt; Cc: Frederic Gueth &lt;<a href="mailto:gueth@iram.fr">gueth@iram.fr</a>&gt;</p> <p>Dear Prof. Lopez Fernandez,</p> <p>I am very happy to invite Mme S. Garcia Alvaro for a period of 1 month (which could be potentially prolonged) to IRAM Grenoble to work on common projects in the area of Millimeter Wave Astronomy Instrumentation.</p> <p>An ideal starting date would be mid of September 2017. With best regards</p> <p>Karl Schuster</p>
DATE OF THE STM	07/09/2017 to 06/10/2017
TOTAL COST OF STM	1.500 €
OTHER SOURCES OF FUNDING	IGN-UAH
<b>Request</b> (max. 2,5 pages)	
Topic	<i>Development of a new 22 GHz vapour radiometer prototype for radio astronomy observations and calibrations</i>
Proposed work	The objective of this research proposal is to develop a new generation receiver, sensitive to water vapour emission (called water vapour radiometers) to counter the effects of the atmosphere on astronomical imaging. Sonia García will work in the test of new components suitable for this new radiometer.

<p><b>Cross-disciplinary</b></p>	<p><i>The new generation water vapour radiometer development will include two main topics: RF design and test and development of calibration schemes. The prototype could be implemented in any radio telescope working in VLBI.</i></p>
<p><b>Impact</b></p>	<p>In interferometry at millimeter wavelengths, additional delays are introduced by refraction of the incoming radiation inside the Earth's atmosphere. The effect results in radio signals not travelling along straight paths, and the excess and variations of path introduce an artificial delay which results in a degradation of the image quality. In particular, drops of water vapour in the atmosphere are responsible for this effect. A direct measurement of the intensity of the water vapour radiation through the shape of the 22 GHz water line, will provide the amount and variations of the path in the propagation of the astronomical signal towards the telescope. Precise detection of time delays will improve interferometric accuracies. The development of a more accurate instrument will be of big impact in interferometry accuracy.</p>
<p><b>Curriculum Vitae</b></p>	<p><i>Master's degree in Telecommunication Engineering. University of Alcalá. Bachelor's degree in Telecommunication System Engineering. University of Alcalá.</i></p> <p><i>Experience Skills.</i></p> <ul style="list-style-type: none"> <li>• <i>Design and construction of Q and W band down-converters for NanoCosmos Synergy project.</i></li> <li>• <i>PCB design and construction (CadStar, CircuitCAM, LPKF).</i></li> <li>• <i>Gain, Noise Figure, S-parameters measurements.</i></li> <li>• <i>Electric circuits simulation (P Spice, LTSpice, Tina).</i></li> <li>• <i>Radio astronomy basics.</i></li> <li>• <i>Electromagnetic simulation: CST, Genesys, ADS.</i></li> </ul> <p><i>Experience with measurement instrumentation:</i></p> <ul style="list-style-type: none"> <li>• <i>Spectrum Analyzer.</i></li> <li>• <i>Vector Network Analyzer.</i></li> <li>• <i>Power detectors.</i></li> <li>• <i>Oscilloscopes.</i></li> </ul> <p><i>International Publications:</i></p> <ul style="list-style-type: none"> <li>- <i>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". Admitted in European Microwave Week (EUMW), 2017. IEEE.</i></li> <li>- <i>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.</i></li> <li>- <i>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". Admitted in European Microwave Week (EUMW), 2017. IEEE.</i></li> </ul>

*National Publications*

- García-Álvaro, S., López-Pérez, J. A., Patino-Esteban, M., Sánchez-Montero, R. (2016, September). "Conversores de frecuencia en banda Q para observaciones radioastronómicas de líneas moleculares del proyecto NanoCosmos." XXXI Simposium Nacional de la Unión Científica Internacional de Radio, URSI 2016.

**Name:** Sonia García Álvaro  
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## Training:

- **2015-2016 Master's Degree Telecommunications Engineering.**  
University of Alcalá de Henares (Spain).

End-of-Master Project: "*Development of frequency converters in Q and W band for radioastronomical observations of molecular lines*". In collaboration with the Technological Development Center of Yebes (CDT) and the IGN / CNIG (National Geographic Institute / National Geographic Information Center) for the European project "NanoCosmos", funded by the European Research Council (ERC), intended to the investigation of organic molecules which are necessary for life formation.

- **2010-2014 Bachelor's Degree Telecommunications Systems Engineering.**  
University of Alcalá de Henares (Spain).

End-of-Grade Project: "*Modeling of extensive targets in radar applications*". In collaboration with the High Frequency Technologies research group of the University of Alcalá.

## Professional experience:

- **2016-2019 Fellow of the National Geographic Institute (IGN)** for the development of radioastronomical receivers. Started on February 2016.
- **2014-2015 Research grant:** Development of a control and monitoring system for Wettzell and Ohiggins S / X receivers. Radiation and Sensing research department, University of Alcalá. Duration: 12 months.
- **2013 Internship program in Nuclear Power plants Almaraz-Trillo (CNAT)** for Instrumentation and Control Maintenance, calibration laboratories and process computing area.

## Other courses:

- **2015 Certification of Completion Vector Network Analysis and Spectrum Analysis Training for KEYSIGHT.**
- **2009 Intensive English course, Missouri, EEUU, Interway, Duration: 5 weeks.**
- **2008 Intensive English course, Oxford, United Kingdom, Interway, Duration: 3 weeks.**
- **2007 Intensive English course, Dublin, Ireland, Interway, Duration: 3 weeks.**
- **2005, 2004, 2003 Intensive English course, Uclés, Spain, Forenex, Duration: 2 weeks.**

## Experience Skills:

- Design and construction of Q and W band down-converters.
- PCB design and construction (CadStar, CircuitCAM).
- Gain, Noise Figure, S-parameters measurements.
- Electric circuits simulation (PSPice, LTSpice, Tina).
- Radio astronomy basics.
- Electromagnetic simulation: CST, Genesys, ADS.
- Matlab, AutoCad.
- Good knowledge of Windows and Microsoft Office.
- Experience with measurement instrumentation:
  - Spectrum Analyzer.
  - Vector Network Analyzer.
  - Oscilloscope.

## Languages:

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

## Participation and attending to congresses:

- **European Microwave Week, Nuremberg 2017, EuMW 2017**
  - o 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.

- 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.
- **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
- **XXXI Simposium Nacional de la Unión Científica Internacional de Radio, URSI 2016.**
  - García-Álvaro, S., López-Pérez, J. A., Patino-Esteban, M., Sánchez-Montero, R. (2016, September). “*Conversores de frecuencia en banda Q para observaciones radioastronómicas de líneas moleculares del proyecto NanoCosmos.*”. XXXI Simposium Nacional de la Unión Científica Internacional de Radio, URSI 2016.

### Other information:

- Availability to travel.
- License of car.