




## RadioNet support for Short Term Missions (staff exchange)

### Application form

STM INFORMATION	
APPLICANT 'S NAME	José Antonio López-Pérez
APPLICANT'S AFFILIATION	<i>Yebes Observatory - IGN Cerro de la Palera s/n E-19141, Yebes, Guadalajara SPAIN</i>
HOST INSTITUTE	<i>Max-Planck-Institut für Radioastronomie Effelsberg Radio Observatory D-53902 Bad Münstereifel, Germany Contact: Mr. Reinhard Keller (<a href="mailto:rkeller@mpifr-bonn.mpg.de">rkeller@mpifr-bonn.mpg.de</a>) Tel: +49 2257 301 128</i>
DATE OF THE STM	12nd – 25 <sup>th</sup> November, 2018
TOTAL COST OF STM	1500 €
OTHER SOURCES OF FUNDING	
<b>Request</b> <i>(max. 2,5 pages without signature part)</i>	
Topic	<p><i>Large reflector antennas used for radio astronomy suffer from surface deformations due to gravity, wind and thermal loads. These deformations distort the optimum parabolic shape for the reflector and produce a reduction of aperture efficiency, which can be very critical at millimeter wavelengths.</i></p> <p><i>Microwave holography is a radio technique to measure the reflector surface accuracy through far-field sampling of the antenna beam with the help of a radio-source in the sky and mathematical field transformations. A good radio-source is a geostationary satellite, whose beacons are very powerful, providing high SNR, and their position is almost fixed in the sky.</i></p> <p><i>Yebes Observatory has a long-time expertise in microwave holography, as staff of this institution contributed to the improvement of the IRAM 30-m surface accuracy, in the surface evaluation of the ALMA antenna prototypes in Socorro (NM, USA), in the optimization of the Yebes 40-m dish and in the holography measurements of the 32-m Medicina radio telescope in preparation for the Sardinia Radio Telescope.</i></p> <p><i>This expertise can be profited by the Max-Planck-Institut für Radioastronomie in order to measure the surface accuracy of the 100-m radio telescope in Effelsberg. Therefore, it is proposed to perform holography measurements of the 100-m radio telescope through a collaboration between Max-Planck institute and Yebes Observatory.</i></p> <p><i>These measurements will allow the determination of the actual surface status of this telescope and will help to decide on a procedure to improve its surface accuracy.</i></p> <p><i>The results can be promoted as a RadioNet activity through publication of a paper.</i></p>
Proposed work	<p><i>It is proposed to perform holography measurements of the 100-m radio telescope surface to evaluate its current surface accuracy.</i></p> <p><i>This work will be done with the help of the Ku-band holography receiver available at</i></p>

	<p><i>Effelsberg and the holography backend (70MHz downconverter and FFT analyzer) available at Yebes Observatory. This backend will be shipped to Effelsberg in due time.</i></p> <p><i>In addition, some software will have to be developed/adapted in order to write the data files. It will merge antenna positions and analyzer data to generate a suitable FITS file that will be read by the Yebes holography data reduction and analysis software.</i></p> <p><i>After system set-up, far-field maps of the telescope beam will be acquired and analyzed to derive the actual surface status of the radio telescope.</i></p> <p><i>If satellites were available at different elevation angles, these maps could provide information on the surface dependence on elevation.</i></p>
<b>Cross-disciplinary</b>	<p><i>This activity will provide an exchange of hardware and software knowledge between two RadioNet institutions in a very special technique like microwave holography.</i></p> <p><i>Nowadays, it is the most accurate and fast technique for the surface characterization of large dishes (&gt; 15 meters in diameter).</i></p>
<b>Impact</b>	<p><i>The results of this activity can be used to select the procedure to improve the surface accuracy of the largest steerable radio telescope in Europe.</i></p> <p><i>Its surface improvement will provide higher aperture efficiency of the telescope and hence reducing the valuable integration time required for radio astronomy observations and providing better quality observations.</i></p>
<b>Curriculum Vitae</b>	<p><i>José A. López-Pérez is the technical coordinator of the Yebes Observatory receiver's group. He got his degree in Telecommunication Engineering in 1996 and his PhD degree in engineering in 2012 in the field of microwave holography for large reflector antennas.</i></p> <p><i>He is responsible for the microwave holography activities and the radio astronomy and geodesy receiver developments in Yebes Observatory, together with RFI detection and mitigation.</i></p> <p><i>José A. López-Pérez, P. de Vicente, J. A. López-Fernández, A. Barcia, and B. Galocha. "Surface accuracy improvement of the Yebes 40 meter radiotelescope using microwave holography". IEEE Transactions on Antennas and Propagation, 62(5): 2624–2633, 2014.</i></p> <p><i>J. A. López-Pérez and J.A. López-Fernández: "Microwave and millimeter-wave technological developments at Yebes Observatory", in 32th URSI GASS Meeting Proceedings, Montreal, 2017.</i></p> <p><i>F. Huang, P. Bolli, L. Cresci, S. Mariotti, D. Panella, J. A. López-Pérez, P. García: "A Superconducting Spiral Bandpass Filter designed by a Pseudo-Fourier Technique", February 2018, IET Microwaves Antennas &amp; Propagation.</i></p>
<p><b>Privacy Policy:</b> <i>With signing this template and applying for RadioNet funding, I accept the <u>Privacy Policy of RadioNet</u>, which is based on the EU General Data Protection Regulation (GDPR).</i></p> <p>Place &amp; Date: Yebes, 2018-06-29</p> <p style="text-align: right;">Signature of the applicant:</p> <div style="text-align: right;">  </div>	
2018-06-29	<p><i>I confirm that the proposed STM is in compliance with the agenda of my organisation</i></p>



*Date and Signature of the applicant*



*Date and Signature of the director of the home institute*

# José Antonio LÓPEZ-PÉREZ

## PERSONAL DATA

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ADDRESS: c/ Ingeniero Mariño, 39, 2C, E-19001 Guadalajara, Spain  
PHONE: +34 658 75 44 59  
EMAIL: ja.lopezperez@oan.es

## WORK EXPERIENCE

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|-----------------------------|---|
| <b>Current</b><br>JULY 2017 | <b>Head of Receiver Group at YEBES OBSERVATORY, Spain</b><br><i>Engineering Supervision and Coordination</i><br>Engineering and administrative direction of the receiver group. Coordination and supervision of the receivers design and construction, installation, commissioning, maintenance and monitoring. Responsible for receiver improvements and new receiver projects. Responsible for RFI management activities. Establishment of national and international collaborations. |
| June 2017<br>JULY 2002      | <b>Deputy Head of Receiver Group at YEBES OBSERVATORY</b><br><i>Radioastronomy Receiver Engineering</i><br>Design, development, integration, tests, installation and commissioning of radioastronomy receivers. Knowledge of radioastronomy techniques, microwave holography for large reflector surface diagnosis, receiver calibration, microwave circuit design and tests, RFI detection and hardware procurement. Administrative tasks and human resources organization.            |
| JUNE 2002<br>MAY 1998       | <b>Engineer at YEBES OBSERVATORY</b><br><i>Receiver Design and Supervision of Radiotelescope construction</i><br>Design of receivers for the 40 meter radiotelescope and supervision of contracts related with 40 meter radiotelescope construction.  |
| APRIL 1998<br>JUNE 1997     | <b>Scholarship at INSTITUTE DE RADIOASTRONOMIE MILLIMETRIQUE (France)</b><br><i>Junior engineer at IRAM, Grenoble (France)</i><br>Design of electronic circuits for IRAM Plateau de Bure Interferometer digital correlator and numerical methods for surface diagnosis of large reflector antennas using microwave holography   |

## EDUCATION

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| JULY 2012  | <b>Ph. D. degree in TELECOMMUNICATION ENGINEERING</b><br><b>Universidad Politécnica de Madrid, Spain</b><br>Thesis: "Radio-holografía de microondas para la optimización de la superficie de grandes antenas reflectoras"<br>Advisor: Prof. Belén GALOCHA (GR/SSR/ETSIT/UPM) |
| APRIL 2007 | <b>Advanced Studies Diploma</b><br><b>Universidad Politécnica de Madrid, Spain</b>   |
| MAY 1996   | <b>Degree in Telecommunication Engineering</b><br><b>Universidad Politécnica de Madrid, Spain</b>  |

## LANGUAGES

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SPANISH: Mothertongue  
ENGLISH: Fluent  
FRENCH: Fluent

## RELEVANT PUBLICATIONS

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1. J. A. López-Pérez and J.A. López-Fernández. Microwave and millimeter-wave technological developments at Yebes Observatory. In *32th URSI GASS Meeting Proceedings, Montreal*, 2017
2. G. Tuccari, W. Alef, M. Pantaleev, M. Lindqvist, J. A. López-Pérez, and J.A. López-Fernández. BRAND - a VLBI receiver to cover the band from 1.5 GHz to 15.5 GHz. In *The 13th EVN Symposium & Users Meeting Proceedings*, 2016
3. P. García-Carreño, S. García-Álvaro, José A. López-Pérez, M. Patino, J.M. Serna, B. Vaquero, J.A. López Fernández, R. Sánchez-Montero, and P. Lopez-Espí. Geodetic VLBI ultra low noise broad-band receiver for 13 meter VGOS radiotelescopes. In *11th European Microwave Integrated Circuits Conference (EuMIC)*, pages 476–476, 2016
4. K. A. Abdalmalak, S. L. Romano, E. García, A. G. Lampérez, F. J. H. Martínez, M. S. Palma, D. S. Vargas, J. M. S. Puente, F. Tercero, J. A. López-Pérez, et al. Radio astronomy ultra wideband receiver covering the 2–14 GHz frequency band for VGOS applications. In *10th European Conference on Antennas and Propagation (EuCAP)*, pages 1–5, 2016
5. J. A. López-Fernández, F. Tercero-Martínez, J. A. López-Pérez, J. M. Serna-Puente, P. de Vicente, J. D. Gallego, and L. R. Santos. Technological developments for VGOS from IGN Yebes Observatory. In *Proceedings of the 22nd European VLBI Group for Geodesy and Astrometry Working Meeting*, volume 1, pages 11–14, 2015
6. José A. López-Pérez, P. de Vicente, J. A. López-Fernández, A. Barcia, and B. Galocha. Surface accuracy improvement of the Yebes 40 meter radiotelescope using microwave holography. *IEEE Transactions on Antennas and Propagation*, 62(5):2624–2633, 2014
7. José Antonio López-Pérez, José Antonio López-Fernández, Félix Tercero, Beatriz Vaquero, and José Manuel Serna. A tri-band cryogenic receiver for VGOS radio telescopes. In *International VLBI Service for Geodesy and Astrometry 2014 General Meeting Proceedings: "VGOS: The New VLBI Network"*, Eds. Dirk Behrend, Karen D. Baver, Kyla L. Armstrong, Science Press, Beijing, China, ISBN 978-7-03-042974-2, 2014, p. 115–117, pages 115–117, 2014
8. A. Rivera-Lavado, S. Llorente-Romano, F.J. Herráiz-Martínez, L.E. García-Muñoz, J.A. Lopez-Fernandez, José A. López-Pérez, F. Tercero-Martínez, and D. Segovia-Vargas. Dyson conical quad-spiral array for VLBI2010. In *8th European Conference on Antennas and Propagation (EuCAP 2014)*, 2014
9. José Antonio López-Fernández, Enrique García, Alejandro Rivera-Lavado, Sergio Llorente-Romano, Francisco Javier Herráiz-Martínez, Javier Montero-de Paz, Mario Méndez-Aller, Luis Santos, José Manuel Serna-Puente, José Antonio López-Pérez, et al. A dual circular polarization broad-band feed for ring focus configuration. 2014
10. José A. López-Pérez and D. Cuadrado. Design, construction and characterization of an IF processor for the FFT spectrometer of the Yebes 40 meter radio telescope. *High Frequency Electronics*, pages 28–35, 2013
11. G. Serra, P. Bolli, G. Busonera, T. Pisanu, S. Poppi, F. Gaudiomonte, G. Zacchiroli, J. Roda, M. Morsiani, and José. A. López-Pérez. The microwave holography system for the Sardinia radio telescope. In *SPIE Astronomical Telescopes and Instrumentation 2012*, pages 84445W–84445W. International Society for Optics and Photonics, 2012
12. D. Cuadrado and José A. López-Pérez. IF matrix switch for the Yebes 40 meter radio telescope receiver room. *Microwave Product Digest*, pages 54–66, 2012
13. José A. López-Pérez, F. Tercero, J. M. Serna, and J. A. López-Fernández. A tri-band cryogenic receiver for the RAEGE project antennas. In *International VLBI Service for Geodesy and Astrometry*, pages 66–70, 2012

14. F. Tercero, José. A. López-Pérez, J. A. López-Fernández, and O. Pérez. S/X/Ka coaxial feed for the tri-band receiver of the RAEGE antennas. *International VLBI Service for Geodesy and Astrometry*, pages 61–65, 2012
15. José A. López-Pérez. RFI measurements at Yebes Observatory and Azores archipelago, 2011
16. D. Morris, M. Bremer, G. Butin, M. Carter, A. Greve, J. W. Lamb, B. Lazareff, José A. López-Pérez, F. Mattiocco, J. Peñalver, et al. Surface adjustment of the IRAM 30m radiotelescope. *Microwaves, Antennas and Propagation, IET*, 3(99-108), 2009
17. J. W. M. Baars, R. Lucas, J. Mangum, and José A. López-Pérez. Near-field radio holography of large reflector antennas. *IEEE Antennas and Propagation Magazine*, 49:24–41, 2007
18. Juan Eusebio Arenas, José Antonio López-Pérez, and Jose Manuel Paez Borrallo. Improvement of a Cassegrain antenna by secondary surface corrections. *Microwave Journal*, pages 82+, 1999



# Max-Planck-Institut für Radioastronomie

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29. Juni 2018

### Invitation to visit the Effelsberg Observatory

Dear Dr. Lopez-Peres!

This is to confirm that we endorse your application for the RadioNet support of a Short Term Mission (STM) project and invite you to come to the Effelsberg observatory within this STM.

The goal of your visit (i.e., the preparation, execution and analysis of a holographic survey of the surface of the 100-m telescope with methods successfully applied at the Yebes antenna) is of high interest for us and we are certain that your visit will be of great benefit.

With kind regards,



Alex Kraus

