RadioNet support for **TA users** at scientific events

Application form

TA PARTICIPANT INFORMATION	
NAME	*Maria Arias de Saavedra*
HOME INSTITUTE	*Anton Pannekoek Institute, University of Amsterdam* *Science Park 904 Amsterdam*
EVENT	Name: 43rd COSPAR Scientific Assembly Place: Sydney Date: 15-23/8/2020 *https://www.cospar-assembly.org*
RADIONET SUPPORT	*3,000 euros for flights, accommodation during the meeting, conference fee, and meals*
OTHER SOURCES OF FUNDING	I will combine this trip with a collaboration visit, and will apply for LKBF funding (Dutch grant)

REQUEST *(max. 2 pages)*

Info about the TA user	- *VRO 42.05.01: LOFAR and IRAM 30m observations of a peculiar mixed-morphology supernova remnant* - *VRO 42.05.01 is a strangely shaped mixed-morphology supernova remnant with two radio half-shells of different sizes and an X-ray bright interior. Our LOFAR observations showed that its spectrum steepens at low frequencies in the radiative shock regions. The interpretation we favoured is that, since the low-frequency electrons have a different diffusion length scale to the high-frequency electrons, they probe different compression ratios along the shock front, and therefore have a different radio spectral index. This explanation requires a dense pre-shock environment. However, when we observed the region with the IRAM 30m telescope we found a diffuse environment, with few, clumped molecular clouds that showed no signs of interaction with the SNR shock. We found a disturbed molecular cloud component that seems to be related to the winds of the supernova progenitor, which allowed us to estimate that it was a 12-14 solar mass star. In order to reconcile the LOFAR and the IRAM 30m observations we suggested that the progenitor star was moving supersonically at the time of explosion, and that the remnant is expanding inside the wind cavity. The bow shock could have given way to the two shell-shape of the source. This mechanism might be relatively frequent, and can help explain the unusual shape of this source, but perhaps also that of mixed-morphology remnants in general. In light of these observations, we have started a new international collaboration that aims to understand how sources such as VRO 42.05.01 came to be, and what is the relationship between the environment, the pre-supernova life of the star, and the remnant, through radio and optical observations, as well as through simulations.* - *This is part of my PhD work, but I have never presented these results at a conference. I will apply for a contributed talk in the supernova remnants session.*

RadioNet has received funding from the EU's Horizon 2020 research and innovation programme under grant agreement No 730562

Use of RadioNet infrastructure	*IRAM 30 m and LOFAR* - *IRAM: 045-18, LOFAR: LC5_012* - *IRAM: PI Arias, LOFAR: PI Vink* - *IRAM: July to October 2018, LOFAR January 2016* - *Two publications: Arias et al. 2019, A&A, 622, A6, and Arias et al. 2019b, accepted in A&A (June 2019), arxiv 1906.03801*
Impact on RadioNet	*I will advertise LOFAR (there are quite few Galactic plane results from LOFAR) to the supernova remnants community. Although supernova remnants are overwhelmingly radio objects, there are not many people who are observing them with LOFAR, and this is a missed opportunity for our community.* *I can also write proceedings.*

Privacy Policy: *With signing this template and applying for RadioNet funding, I accept the Privacy Policy of RadioNet, which is based on the EU General Data Protection Regulation (GDPR).*

Place & Date: June 13
Amsterdam ~~2018~~ 2019

Signature of the applicant:

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