



# Report from the event supported by RadioNet

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**TITLE** *REVISITING NARROW-LINE SEYFERT 1 GALAXIES AND THEIR PLACE IN THE UNIVERSE*

**DATE:** *10-04-2018, 13-04-2018*

**LOCATION:** *PADOVA, ITALY*

**MEETING WEBPAGE:** *<HTTPS://INDICO.ICT.INAF.IT/EVENT/543/>*

**HOST INSTITUTE:** *UNIVERSITY OF PADOVA*

**RADIONET  
BENEFICIARY / NO:** *INAF / 4*

# Report:

## 1. SCIENTIFIC SUMMARY

The aim of this conference, held in Padova Botanical Garden between 2018 April 10-13, has been to gather world-wide experts on the investigation of Narrow-Line Seyfert 1 galaxies (NLS1s), to assess our present understanding of these peculiar objects. After more than 30 years of investigation, it is clear that NLS1s represent a key element in the picture of active galactic nuclei (AGN) astrophysics, with many properties that are matter of ongoing debate. The conference was proposed as a development of a previous event, designed to present a summary of the overall situation of this field, including discussion of recent discoveries, new conclusions and still open questions.

The conference plan included invited review talks (40 min), contributed talks (20 min), and posters. During the third day, a one-hour session dedicated to Lucrezia Cornaro has been devoted to the topic of gender balance in astrophysics. The schedule of the conference was organized in four different topics, one per day.

During the first day (April 10), the main topic was optical properties of NLS1s. The optical band, indeed, is where the original NLS1 classification came from. One of the most relevant improvements was that shown by Dr. Rakshit, supported by RadioNet, who presented a new large sample of NLS1s derived from the Sloan Digital Sky Survey, bringing the number of known objects from around 1000 to more than 11000. A large debate was devoted to the matter of iron in NLS1s spectra, which provided robust evidence for the presence of fast inflows of unknown origin. We also discussed the results of new reverberation mapping campaigns that, by means of repeated observations, provided precious details about the central engine properties, confirming the low black hole mass of NLS1s.

The second day (April 11) was entirely devoted to the radio properties of NLS1s. During this session, important results obtained with RadioNet facilities have been presented (EVN, Effelsberg, Metsahovi). The most interesting result was the detection, obtained with Metsahovi at 37 GHz by Prof. A. Lähteenmäki, of some radio-quiet NLS1s. This amazing discovery shows that relativistic jets are present not only in the well-known radio-loud objects, but also among radio-quiet sources, and that even these typically “weak” jets can present some extreme properties. The detection at such high frequency indeed presents a challenge for our current understanding of relativistic jets. This point is by far the most significant for the RadioNet community, because it will draw new interest on this class of sources, and can be of crucial importance for the community of radioastronomers.

During the third day (April 12) the main topic was the central engine as seen from the X-rays. The session indicated that the origin of X-rays in NLS1s, and in particular the spectral complexity that is often observed, is still highly controversial. A new, orientation-based model was presented by Prof. C. Done in order to explain the unpredictable behavior of some objects at these frequencies, but no consensus has been yet reached on this point. A special one-hour session has been dedicated instead to the topic of gender balance in astrophysics. The session, attended with interest by all the participants, led in the end to a debate, confirming the importance of this crucial issue, and that much work must be done in the next years to finally solve the disparity between genders in astrophysics and in science in general.

The last session on day 4 (April 13) finally was dedicated to one of the most intriguing aspects of NLS1s, that is their black hole mass and its relation with the host galaxy. Thanks to infrared and optical observations, new important results were presented, showing that the host galaxy is typically a spiral with a pseudobulge also for high redshift objects, thus confirming that the black hole mass of NLS1s is indeed lower with respect to other AGN. The same result was obtained also via the modeling of the spectral energy distribution of

several radio-loud NLS1s, leading therefore to the conclusion that NLS1s are a young evolutionary phase of active galactic nuclei, and likely the analog of early quasars observed in present day Universe.

The RadioNet community has been actively involved in the conference. As mentioned before, they had a unique chance to present some of the most interesting results of the entire meeting, providing a strong visibility for RadioNet facilities. Furthermore, the open discussion during coffee breaks and social events allowed the development of new collaborations between the RadioNet community and other researchers working with facilities at different frequencies. This kind of result cannot be tangibly shown right now, but will be clear in the long term, when these newborn collaborations will lead to new projects carried on with RadioNet facilities.

The website link is:

<https://indico.ict.inaf.it/event/543/>

## 2. AGENDA OF THE EVENT

The detailed program of the conference is provided in the attachment, and can be also found online at:

<https://indico.ict.inaf.it/event/543/page/156-scientific-programme>

## 3. PARTICIPANTS

The geographical distribution of the participant is shown in Fig.1. They came from 23 different countries, and all continents. The total number of registered participants was 73, 45 men and 28 women (61-39%), with 19 students (25%). The ratio of contributed talks showed a higher women participation (58-42%). The invited experts supported by RadioNet provided very relevant contributions to the conference, presenting some of the most suggestive results, such as the largest survey of NLS1s to date and the detection of several new spiral galaxies harboring radio-loud objects. The list of participants with their signatures is attached.



Fig.1. Countries of origin of the participants at the conference.



Fig.2 Conference picture

#### **4. RADIONET FINANCIAL CONTRIBUTION**

RadioNet support will be used to support the travel expenses of 5 supported researchers, 400€ per person.

#### **5. PUBLICATIONS**

*The project leading to this publication has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730562 [RadioNet]*

The proceedings of the conference will be published on Proceedings of Science (SISSA, Trieste, Italy). The website for the proceedings is already available at the following link:

<https://pos.sissa.it/cgi-bin/reader/conf.cgi?confid=328>