

## Feasibility project for the ngVLA: a science case with MASers (ngVLAmas)

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**Abstract:** The next-generation Very Large Array (ngVLA) is envisaged to become the most important radio facility of the next decades, with a scientific impact similar to that of the iconic VLA in the '80s. In the light of its foreseen capabilities, we are carrying on a pilot project, by combining the VLA and VLBA telescopes simultaneously, to simulate the outcome of a future ngVLA experiment. Our goal is to deliver a new tool to explore the proto-planetary disk regions in the next future, via maser emission at a level below 1 mJy, which cannot be probed by current interferometers yet. Our funding request seeks for support to train ourselves on the calibration techniques needed by both the current project and the next-generation facilities, through exchange visits at the NRAO in Virginia.

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### Main Collaborators:

[internal] Dr. Luca Moscadelli — INAF, Astrophysical Observatory of Arcetri (IT)

[external] Dr. Todd Hunter — NRAO, National Radio Astronomy Observatory, Charlottesville (VA, USA)

STATUS: project running on time

**Achieved** — with reference to the Gantt Chart to the right

- **Work-packages (WPs) number 0, 1, and 2 concluded successfully:**
  - ✓ **Data acquired at end of October 2022**
  - ✓ **First visiting period at NRAO in Charlottesville (VA) spent between end of April 2023 and beginning of June 2023**
  - ✓ **Data reduction and full imaging executed during/after visiting period**

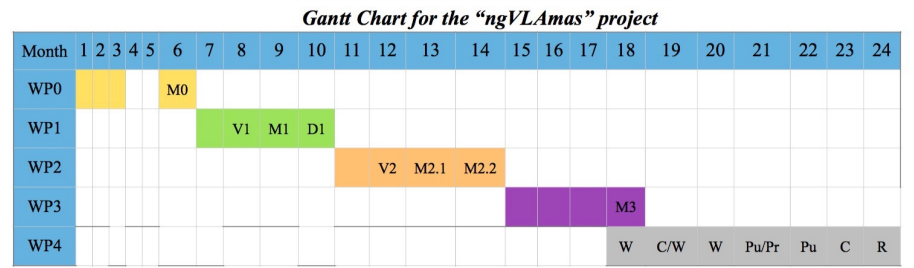
**Budget** — midterm expenditure (of 20k Eur allocated)

- ✓ **First visiting period at NRAO (spent: 7k Eur)**
- ✓ **Computing/hardware goods (spent: 4k Eur)**

**Expected** — steps to achieve during 2024

- ★ **Second visiting period at NRAO**
- ★ **Develop/accomplish both WP3 and WP4**

FEEDBACK (MIDTERM): no major drawbacks



**WP0 - Observations preparation & execution**  
 Observations are set between June and July 2022, with scheduling writing planned for May 2022  
 Milestone, M0 - Observational data on hand (expected about 2 months after execution)

**WP1 - Observations calibration & python scripting**  
 Visiting, V1 - Training period at NRAO for HSA calibration  
 Milestone, M1 - Data reduction of HSA observations at 22 GHz  
 Deliverable, D1 - Preparation and delivery of a python pipeline for automated calibration

**WP2 - Imaging trials & optimisation**  
 Visiting, V2 - Training period at NRAO for HSA imaging  
 Milestone, M2.1 - Working on imaging performance and properties of brightness maps  
 Milestone, M2.2 - Self Calibration and final imaging

**WP3 - Analysis & modelling**  
 Milestone, M3 - Products of imaging cubes, modelling of brightness distribution, analysis of general results

**WP4 - Dissemination & outreach activities**  
 This work package foresees dissemination of project results and outreach activities as described below:  
 Deliverables - Conferences (C), Paper writing (W), Publication (Pu), Press releases (Pr), Project reports at NRAO and OACa webpages (R).