



**PhD Project**



Title: Detection of Gravitational Waves from coalescence of compact objects in the incoming O4 observational run at the interferometer Advanced Virgo.

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Advanced Virgo is a second generation interferometer located in Cascina, near Pisa, Italy, working in close coordination with the twin American interferometers LIGO and the Japanese KAGRA. In the first observing run (O1) the discovery of gravitational waves was announced and in the subsequent runs (O2 and O3) about one hundred of events of compact object coalescences were detected, with invaluable scientific results in the field of general relativity, black holes, neutron stars, cosmology and so on.

The fourth observing run (O4) is expected to start at the beginning of 2023. The candidate will participate actively on the run, on the detector characterization and on the detection of gravitational waves. He or she is expected to develop new searches involving more advanced templates with, for example, higher order modes, precessions, and so on. New methods to control the noise feature will also be analysed.

The Urbino-Firenze group is particularly involved in the development of the multiband template analysis (MBTA) pipeline, both for low-latency detections and for offline analysis and the candidate is expected to participate in it. Advanced computing and machine learning approaches are encouraged.