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UNIVERSITÀ
DEGLI STUDI
DI PADOVA

**PhD course of National Interest in Technologies for
Fundamental Research in Physics and Astrophysics**

Annual report

Name and surname: *Salvatore Camposeo*
Cycle and a.a.: *39o, 2023/2024*
Supervisor: *Nicola Giglietto, Leonardo Di Venere*

- **Research activity carried out during the year**

Describe the aim of the project (very briefly), discuss the research activity carried out during the year mentioning the difficulties encountered until now and the actions taken to face them. 1 page max in total.

Focus of my research activity is the analysis of Fermi Gamma-ray Space Telescope Data, with a particular focus on Solar System Objects.

During the first year I acquired the necessary skills to perform the data analysis, in particular learning the Python programming language and the analysis tools developed by the Fermi-LAT collaboration, such as Fermipy. In addition, I investigated in more depth the gamma-ray emission mechanisms from astrophysical objects and the modern detectors that are currently used to measure astrophysical gamma rays. After the initial training, a study of Jupiter's high energy photon emission has been started. Since Jupiter is a moving source in the celestial reference frame, a quasi-static analysis was developed, in which Jupiter can be considered fixed. The first preliminary results have been obtained. A stacking of the results obtained will be performed to exploit the full available statistics of LAT data.

This initial part of my research will afterwards be followed by simulations of emitting environments, exploiting High Performance Computing (HPC), in order



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to predict the gamma-ray emission from Jupiter.

*All current and future analysis are being performed on the HPC system available
at the Physics Department in Bari (ReCaS platform).*

*Any programming and analysis issues encountered in the first year have been
well addressed and solved.*

- **List of attended courses and passed exams**

Particle detectors in space – ATTENDED and PASSED

New Technologies for Cherenkov telescopes – ATTENDED and PASSED

Scintillators and Silicon Photomultipliers – ATTENDED (exam scheduled in September)

Simulation of opt. photon propagation for scintillators – ATTENDED (exam scheduled in October)

- **List of attended conferences, workshops and schools, with mention of the
presented talks**

Kick-off meeting of PhD students in Padova, July 2024

International Physics School “Francesco Romano”, in Monopoli, scheduled for 6-13 October 2024

- **List of published papers/proceedings**

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- **Thesis title (even temporary)**

High energy photon emissions from Solar System objects

Date, 2/9/2024

Signature...

Servatore Campese

Seen, the supervisor

Wade G.