Contribution ID: **131** Type: **Oral**

Massive Argon Space Telescope (MAST): heavy time projection chamber as a next-generation space gamma-ray observatory

Thursday 5 December 2019 15:55 (15 minutes)

We propose a new concept of gamma-ray telescope called MAST [1] (an abbreviation from "massive Argon space telescope") for the energy range of 100 MeV –1 TeV based on the liquid Argon time projection chamber (LAr TPC) technique. The LAr TPC technique has many important advantages, including simplicity, scalability and cost-effectiveness, at the same time allowing to obtain good spatial (and hence angular) resolution. Using last-generation rockets such as Falcon Heavy [2], it is possible to launch a payload with the mass up to 30–40 t to a medium (~500 km) circular Earth orbit, for the first time allowing to reveal the potential of the LAr TPC technique in gamma-ray astronomy. We estimate the basic parameters of the MAST telescope and show that the achievable angular resolution is 3-10 times better than the Fermi-LAT one [3] depending on the energy, and the differential sensitivity is about one order of magnitude better than the Fermi-LAT one. The energy resolution of the MAST telescope is comparable to the Fermi-LAT one (about 20 % at 100 MeV and between 6 % and 10 % for the 10 GeV –1 TeV energy range). Such an instrument with an effective energy threshold ˜100 MeV, very good sensitivity, and reasonable energy resolution would have a great potential in a wide range of astrophysical tasks, including observations of active galactic nuclei, the search for gamma-ray counterparts of IceCube astrophysical neutrinos, the studies of the extragalactic background light, extragalactic magnetic field and extragalactic gamma-ray background, and dark matter searches. The details of our calculations are available in [1]. This work was supported by the Russian Science Foundation (RSF) (project No 18-72-00083).

References

1. T. Dzhatdoev, E. Podlesnyi, Astroparticle Physics, 112, 1 (2019) (arXiv:1902.01491)
2. https://www.spacex.com/falcon-heavy
3. W. B. Atwood et al., ApJ, 697, 1071 (2009)

Authors: Mr DZHATDOEV, Timur (Moscow State University); Mr PODLESNYI, Egor (Moscow State University)

Presenters: Mr DZHATDOEV, Timur (Moscow State University); Mr PODLESNYI, Egor (Moscow State University)

Session Classification: Parallel

Track Classification: Gamma rays