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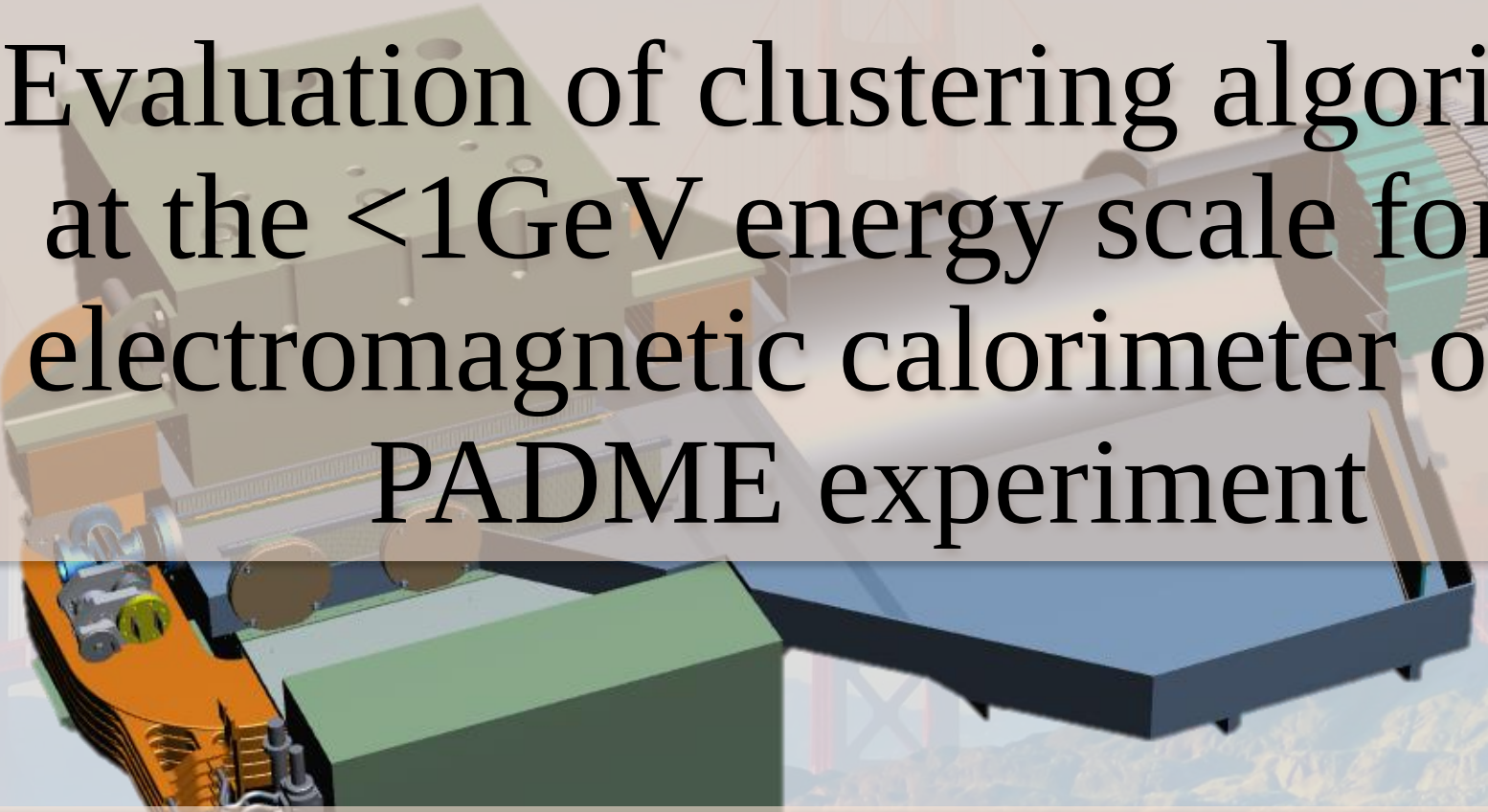
# Evaluation of clustering algorithms at the <1GeV energy scale for the electromagnetic calorimeter of the PADME experiment



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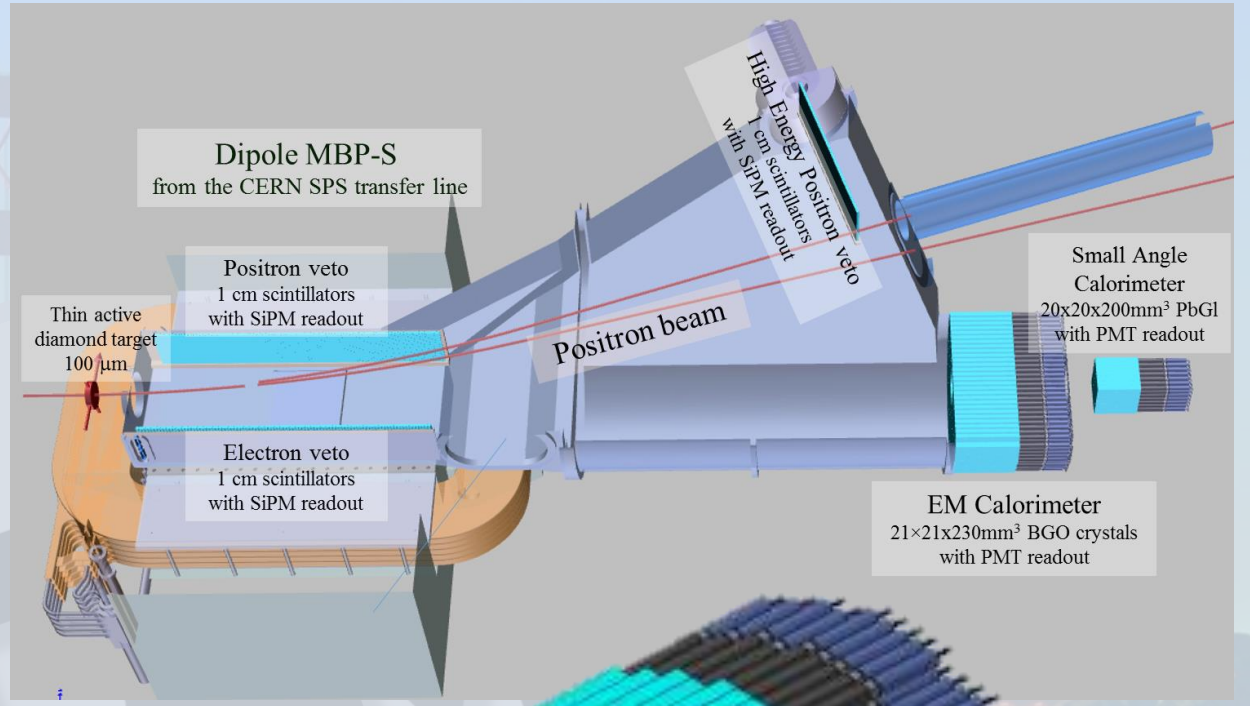
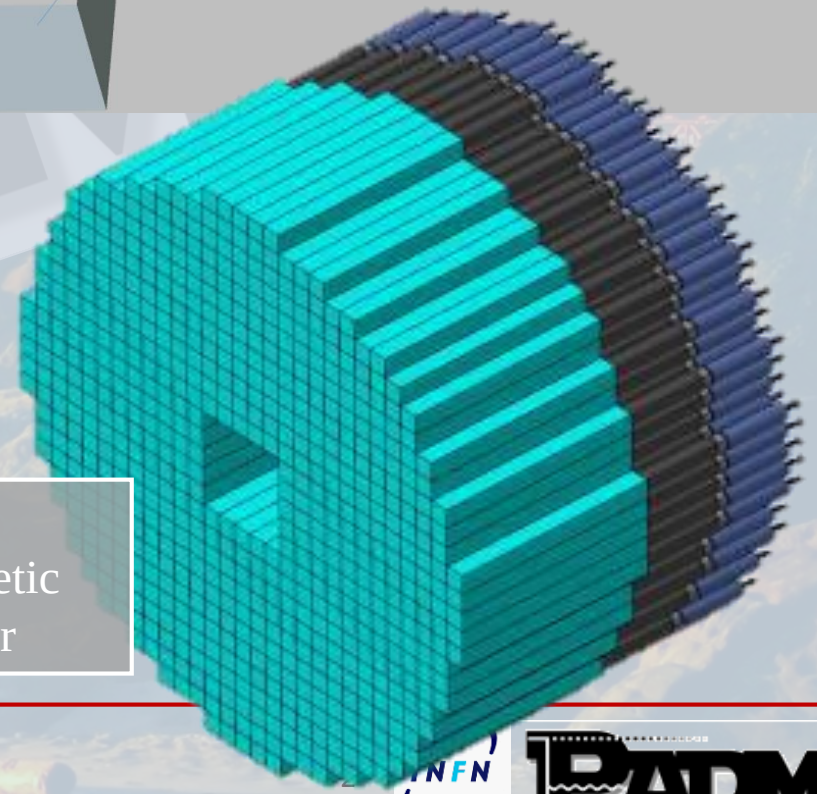
# The PADME experiment

- PADME (Positron Annihilation into Dark Mediator Experiment) will look for invisible production of the A′ dark photon with mass up to 24 MeV in the annihilation channel $e^+e^- \rightarrow A'\gamma$.
- It will use a 550 MeV $e^+$ beam from the DAFNE Beam Test Facility (BTF) interacting with a thin diamond target.
- Goal: collect O($10^{13}$) $e^+$ in 2018-2019
- The recoil $\gamma$ is detected by the e.m. calorimeter
  - 616 2.1x2.1x23cm$^3$ BGO crystals from the L3 e.m. endcap
  - PMT readout,
  - Angular coverage: ~ 20-93 mrad.
  - Energy resolution: < 2%/√E
  - Spatial resolution: ≲ 5 mm
  - Time resolution: ≃ 500 ps



PADME electromagnetic calorimeter

# PADME clustering algorithms

- The crystal clustering algorithm is crucial to optimize the calorimeter's resolution.
- Two different clustering strategies are being tested:
- **Radius algorithm**: collect all crystals within a given radius from an energy maximum.
- **Island algorithm**: start from a local energy maximum and attach adjacent crystals of lower energy.
- These algorithms have been included in the PADME general software framework and have been tested both on real data from testbeams and on MC events.