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GAMERA: a gamma-ray telescope for the gravitational wave astrophysics era

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GAMERA is a SmallSat concept for a large, broad-band (20-2000 keV), wide-field (>2pi sr) instrument that would serve as the prime gamma-ray telescope for gravitational wave (GW) astrophysics in the Advanced LIGO/Virgo era. GAMERA could be built today using components currently at TRL 6 or higher, and thus can be quickly developed for an existing SmallSat-class spacecraft bus, and assembled, tested, and launched by the time Advanced LIGO/Virgo reach their design sensitivities in the 2023+ timeframe.

The instrument consists of an array of scintillator detectors with effective area 6 to 7 times greater than Fermi GBM. It will detect short GRBs (SGRBs) like the low-luminosity GRB170817A/GW170817 at 2.5x greater distances (100 Mpc), and with its excellent time and spectral resolution and large area, it will characterize the prompt gamma-ray emission component in detail. To enable joint GRB and subthreshold GW signal searches seeded on the gamma-ray detection, GAMERA will provide typical degree-scale localizations. In addition to forefront GRB physics, GAMERA will provide continuous monitoring of other types of gamma-ray transients, addressing the physics of accreting pulsars, magnetars, and Galactic binary systems.

In this talk, we present the instrument concept and an overview of design and performance, demonstrating that GAMERA will provide the most detailed GRB physics measurements achievable within the low-cost (<35m) SmallSat envelope.