Abstract Submitted
for the CUWIP22 Meeting of
The American Physical Society

Analysis of Sky-localization Capability of Lunar Gravitational Wave Antenna ANA CAROLINA OLIVEIRA, Columbia University, MARICA BRANCHESI, JAN HARMS, Gran Sasso Science Institute — The study of gravitational waves (GWs) is a rapidly expanding field, and the development of new technologies is a big step towards the advancement of knowledge about these cosmic ripples and their sources. The Lunar Gravitational-Wave Antenna (LGWA) is a proposed GW detector located on the Moon that will operate with an antipodal pair of high-sensitivity seismometers monitoring the vibrational normal modes of astronomical objects. This project examines the sky-localization ability of the proposed Moon-located detector, with a structure of 4 seismometers located on the lunar South Pole. The analysis is conducted through the expansion of an algorithm that uses the Fisher matrix approach for statistical analysis of signals, modifying it to process calculations for detectors in selenographic coordinates. The algorithm runs analyses on models of BBH and BNS sources, estimating the sky-localization of real astrophysical sources detectable by LGWA. Results show that LGWA is able to make 12 detections per year for BBH signals with SNR>7, out of 1719 signals with redshift (z) <0.4, with 7 detections being localized within 1 deg^2. For BNS, LGWA detects 2 signals per year above the same SNR threshold, out of 14421 signals with z<0.4, with 1 detection localized within 1 deg^2.

Ana Carolina Oliveira
Columbia University

Date submitted: 11 Jan 2022 Electronic form version 1.4