Contribution ID: **138** Type: **Poster**

Multi-messenger Astrophysics Master Class: Gamma Rays

Tuesday, 11 October 2022 10:59 (1 minute)

As part of the international gravitational wave collaboration for education and public outreach (IGRAV), Fermi communications and outreach is supporting the development of the gamma-ray content for a Multi-Messenger Astrophysics Master Class. The Master Class is being created for use in high schools, and represents how scientists work together using different types of data to make sense out of astrophysical phenomena. The event that inspired the class is GRB170817A (GW170817), the "golden binary"neutron star merger observed by more than 70 ground and space-based instruments on August 17, 2017. Along with the gamma-ray activities that use Fermi GBM data, activities are being developed by IGRAV members for other messengers including: gravitational waves, x-ray and radio data, and visible light data. The students will be divided into teams: each team will study one type of messenger for the first two days. On the final day, all the data will be combined to reveal the big picture, and to measure the Hubble constant.

The first day's activities introduce the messenger and physical information about the types of events that will be analyzed. For Fermi, this is the "gamma-ray burst game"in which the students are asked to sort 15 different bursts into categories based on properties. This game is complete and can be played at the Astronomy from Home website (http://afh.sonoma.edu, see the Discover tab). Day 2 combines information as teams pass results from day 1 to other teams, and continues the analysis of the candidate event. For the gamma-ray messenger team, this means analyzing three different bursts to determine T90, and then classifying the candidate burst. Using additional positional information from the other teams, the gamma-ray team will then add in the GBM data to determine an approximate sky location for the event. Finally, the observed luminosity will be compared to a model of the flux expected at the measured distance, and the inclination angle to the jet axis will be determined.

This research was supported by NASA grant #80NSSC22K0081 to Sonoma State University. We greatly appreciate the work done by Jesse Nelson, Adam Kinmont, and Casey Lewiston in support of the gamma-ray burst game.

Track

Gravitational Waves

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Session Classification: Poster session