Project Title:

Improved hydrodynamical simulations of gamma-ray burst central engines

Name:
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1． Background and purpose of the project, relationship of the project with other projects

Binary neutron stars lose their angular momentum by emitting gravitational waves to merge at the last moment. The coalescence of double neutron stars results in one of the most energetic explosions in the Universe. The simultaneous observation of GW170817 and GRB 170817A revealed that the merger of binary neutron stars is one of the origins of short gamma-ray bursts (sGRBs). In addition, the kilonova event was also observed at the same time as GW170817/GRB170817A, which confirmed that the rapid neutron capture process is going on in kilonovae. As of March 2025, there has been no confirmed detection of gravitational waves from binary neutron stars since this event, but these successful detections served as a catalyst for the development of multi-messenger astronomy.

In this project, we investigate the opening angle of the relativistic jet launched from binary neutron star mergers - because there is a deviation from that measured in GRB170817A and those estimated from observations of many sGRBs.

2． Specific usage status of the system

In this FY, we have not used the computing node of HOKUSAI BW2.

3． Schedule and prospect for the future

In the next FY, we will continue the discussion and finish writing the paper. We will use additional CPU time if we need any other models to verify our results. We will also keep the data in HOKUSAI to analyze the results.

4． If no job was executed, specify the reason.

In FY 2024, we used the login node to analyze the results but have not executed any jobs related to this project in the computing node since we are now summarizing this work and writing papers.