Scalable Cyberinfrastructure to support Multi-Messenger Astrophysics

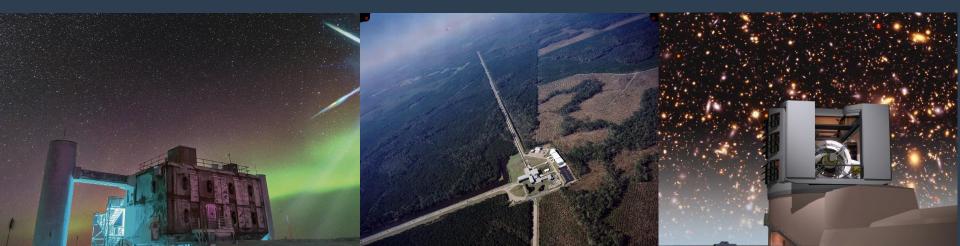
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NSF OAC-1841625: Community Planning for Scalable Cyberinfrastructure NSF OAC-1934752: A Framework for Data Intensive Discovery in Multimessenger Astrophysics



MMA: sample science drivers

High-energy neutrinos detected and localized to a galaxy cluster trigger electromagnetic follow-up of a tidal disruption event. Early-warning of compact binary mergers via gravitational waves allowing the detection of the earliest phase of the electromagnetic counterpart. A Galactic of Local Group supernova observed across all the messengers.

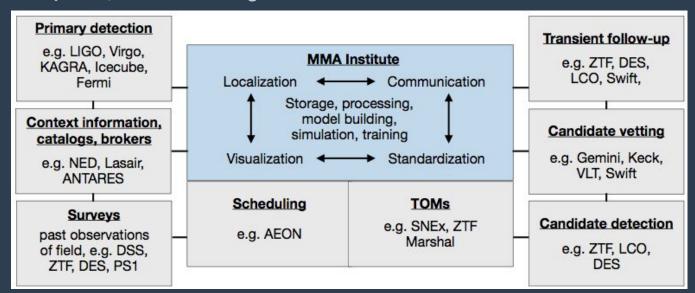


SCiMMA activities 2018-2019

Workshopc summaries & white papers https://scimma.org/documents.html

- Exploration & documentation of disiderata:
 - Workshops: Deep Learning @ NCSA, SCiMMA @ NYC, SCiMMA Inference @ UCSB.
 - Systems, Data Management, Inference & Machine Learning, Modeling and theory, Education & workforce development, Policies & Management.

Data flow & collaborative network of people and instruments





SCiMMA activities 2019-2021

- Framework for Data Intensive Discovery in Multi-messenger Astrophysics
 - Prototype solutions that address immediate needs
 - Baseline design for an institute to support MMA into the 2030s.

Primary Detection Instrumentation

Identifies candidates, provides coordinates and classification. Examples: LIGO, IceCube, LSST, .. O(10) instruments

Sustainable Cyberinfrastructure Insitute to support MMA

Foundation for statistical and historical studies. Aspires to retain record of primary detections, follow-up observations, and relevant supporting data. Enables tractable access to MMA observations and follow-on analysis. Expedites follow-up observations and discovery

Archival Data

Catalogs of static and transient sky

Scientific Stakeholders

Exploitation, Knowledge

Follow-up Observations

Provides additional observations, O(100) instruments worldwide

Simulations

Physics models which predict observables

