



Gravitational Wave Astrophysics and 2020 Decadal Survey

Jim Ulvestad

Acting Assistant Director

Directorate for Mathematical and
Physical Sciences

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NWNH

- Science frontier discovery areas
 - Gravitational wave astronomy
 - Time-domain astronomy
- NWNH, p. 42: "We are on the verge of a new era of discovery in gravitational wave astronomy"
- LISA was considered as a large project for ranking, but not LIGO, because NWNH covered NSF astronomy but not NSF physics



Gravitational Wave Detectors

- Detections of four binary black-hole mergers and one binary neutron-star (NS) merger published to date
- LIGO is currently off-line for a year for work to enable it to reach the design sensitivity of Advanced LIGO
 - At design sensitivity, the number of NS mergers should increase by at least a factor of a few, and could well approach one per month
- VIRGO will have improved sensitivity over the next 1-2 years, and detector in Japan should come on line



Issues to Consider

- Gravitational wave science was considered in the 2010 decadal survey, and surely should be considered in 2020
- With more NS mergers, electromagnetic follow-up will be key, and any discussions of telescopes need to consider their capabilities in this area
- Combination of gravitational and electromagnetic messengers is key to the NSF Big Idea: Windows on the Universe
- Science should not be bounded by organizational lines
- However, recommendations on capabilities need to be executable, in context, and not conflicting with the work of other groups that pay attention to Physics priorities