

10th International Conference on Gravitation and Cosmology: New  
Horizons and Singularities in Gravity (ICGC 2023)



Contribution ID: 458

Type: **not specified**

## Astrophysical Implications of Gravitational Wave Observations (Invited Talk)

*Friday 8 December 2023 14:15 (30 minutes)*

Since the Nobel winning discovery of gravitational waves (GWs) by the LIGO-Virgo-Kagra (LVK) detectors from merging compact object binaries, understanding the various astrophysical formation channels of these sources has come to sharp focus. While qualitatively, the processes involved in producing these astrophysical systems are well understood, cutting-edge research is underway to put better constraints on several uncertain aspects that can affect the distribution of properties and expected rate of mergers depending on the formation channel. I will give a brief overview of the various formation channels, their unique characteristics, and the major sources of uncertainties. I will give a broad overview of the current state-of-the art of our theoretical understanding and predictions and discuss possible ways forward, using GWs in different frequency bands with future and upgraded detectors, and using other ongoing and upcoming electromagnetic surveys that can provide the key ingredients to better model GW sources.

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**Session Classification:** Workshop on Astrophysical Relativity