Contribution ID: **35** Type: **not specified**

Neutron Stars and Black Holes as Compact Remnants of Stellar Death

Tuesday 26 March 2024 14:40 (25 minutes)

At the end of their lives massive stars collapse to neutron stars or black holes, often associated with the violent ejection of matter in supernova explosions. When born in binary systems, these compact remnants act as sources of the gravitational waves measured by advanced LIGO-VIRGO, the Japanese KAGRA detector, and of their next-generation successors. However, the links between
single-star and binary progenitor systems on the one hand and stellar explosions and their remnants on the other hand are still largely unclear. Supernova 1987A in the Large Magellanic Cloud was not only the closest supernova observable by the naked eye within 400 years, but also marked the beginning of multi-messenger astronomy due to the first detection of neutrinos from an
extragalactic source concomitant with superb observations over a wide spectrum of electromagnetic channels. A next galactic stellar collapse event will provide far better neutrino statistics and is also a promising source of gravitational waves, in particular for the next-generation interferometers. The combined measurement of these signals together with the firework of multi-waveband radiation will help us deciphering long-standing questions of the supernova explosion mechanism, of the birth
properties of neutron stars, and of nuclear, neutrino, and particle physics that play a role in the hot, newly formed neutron star. Meanwhile detailed observations of pulsars and of neutron stars with their associated gas remnants, a growing catalog of gravitational-wave signals from compact object mergers, and an exponentially bursting number of supernovae in conjunction with increasingly more refined and realistic theoretical models will expand our understanding of the population systematics of stellar death events and their compact remnants.

Presenter: JANKA, Hans-Thomas