

Friday, December 1st
4:10 – 5:00 PM
Barnard Hall 103

**The Spin Induced Quadrupole Moment as a Probe of the Nature
of Compact Objects**

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Abstract: Since the first confirmed gravitational wave detections, we have observed more than a hundred binary black hole mergers and a handful of mergers involving neutron stars. While there are definitive differences between black holes and other objects by which we could classify them, the identification of these objects is largely done based on their masses. There is currently a convention whereby if an object observed in a GW event has a mass predicted to be above $5M_{\odot}$ we label it a “black hole”, and similarly if it has less than $2M_{\odot}$ we label it a neutron star. This classification system has some obvious downsides: it fails to say anything about the $2.6M_{\odot}$ object observed in GW190814, do we classify it as the heaviest neutron star, or the lightest black hole? More broadly, if we want to search for black-hole mimickers we need more definitive methods of telling the difference between black-holes and other objects. I will begin the colloquium by comparing the advantages and disadvantages of some such potential methods. Following this, I will discuss one particularly promising avenue: the spin-induced quadrupole moment, and our recent developments in semi-analytic waveform modelling that will better allow us to measure this quantity in future binary mergers. Finally, I will discuss recent work to assess how well current and next generation detectors will be able to constrain the black hole nature of compact objects using their spin-induced quadrupole moment alone.

Host: Hang Yu

** Refreshments served in the Barnard second floor atrium at 3:45. **