ABSTRACT:
Teukolsky equation in Kerr spacetimes governs the dynamics of the spin $s$ components, $s = 0, \pm 1, \pm 2$ corresponding to the scalar field, the Maxwell field, and the linearized gravity, respectively. I will discuss recent joint work with L. Zhang on proving the sharp asymptotics for these spin $s$ components in Kerr spacetimes. I will show how a global conservation law is used to derive the precise asymptotics of the spin $s$ components and describe how it can be employed to compute the sharp decay for solutions to some semilinear wave equations arising from small, smooth, rapidly decaying initial data.