

## Analytical methods in GR

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Analytical approximations play an important role for gravitational waves from merging binary systems, where the measurements of the signals are based on cross-correlations with theoretical models. Computing accurate models is a challenging task that often requires a combination of several different approximation schemes and synergies with numerical relativity.

In these lectures, I will give an introduction to some of the 'traditional' analytical methods relevant for gravitational waves. The topics will include basics of post-Newtonian theory, post-Minkowski expansions, the use of matched asymptotic expansions in this context, and black hole perturbation theory. I will discuss applications of these tools to the gravitational waves from merging binary systems and also outline recent progress and remaining challenges.