Two-Body Dynamics and Gravitational Waves from the Eikonal Exponentiation

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The eikonal exponentiation provides a natural strategy to calculate classical gravitational observables from the loop-expansion of gravity amplitudes. In this talk I will illustrate how the eikonal can be applied to obtain the deflection angle for the collision of two non-spinning black holes. The inclusion of radiation-reaction effects results in a deflection angle with a smooth behavior at high energies, where it agrees with the universal massless result up to $\mathcal{O}(G^3)$. I will also discuss how the eikonal phase can be promoted to an operator combining elastic and inelastic amplitudes in order to calculate the change in linear and angular momentum of each colliding body, including dissipation effects due to gravitational wave emissions.