Black hole in a post-Newtonian tidal field ERIC POISSON, University of Guelph — In this talk I describe an ongoing project that aims to determine the tidal distortion of a nonrotating black hole when it is placed in the presence of other nearby bodies. The context of this work is very general, but the focus here will be on post-Newtonian tidal environments. The first part of the project consists of calculating the black-hole metric in terms of arbitrary tidal fields that characterize the tidal environment. In the second part the tidal fields are determined by inserting the black hole within a global spacetime that contains the other bodies. Here the global spacetime contains an arbitrary number of bodies that move slowly under their weak mutual gravity, and its metric is described by post-Newtonian theory. We calculate the tidal fields acting on the black hole and express them in terms of the post-Newtonian potentials. Because the post-Newtonian metric of the N-body system is not valid in the strongly-gravitating environment of the black hole, we work in a buffer region around the black hole where the tidal metric and the post-Newtonian metric are both valid. The tidal fields are determined by matching the two metrics in this buffer region.

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