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Kicked waveforms: prospects for direct detection of black hole recoils[1] DAVIDE GEROSA, Caltech, CHRISTOPHER MOORE, University of Cambridge — Generic black hole binaries radiate gravitational waves anisotropically, imparting a recoil, or kick, velocity to the merger remnant. If a component of the kick along the line of sight is present, gravitational waves emitted during the final orbits and merger will be gradually Doppler shifted as the kick builds up. We develop a simple prescription to capture this effect in existing waveform models, showing that future gravitational wave experiments will be able to perform direct measurements, not only of the black hole kick velocity, but also of its accumulation profile. In particular, the eLISA space mission will measure supermassive black hole kick velocities as low as 500 km/s, which are expected to be a common outcome of black hole binary coalescence following galaxy mergers. Black hole kicks thus constitute a promising new observable in the growing field of gravitational wave astronomy.

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