

Abstract Submitted  
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**Evolution of Highly Eccentric Binary Orbits with Radiation Reaction: An Analytic Approach**<sup>1</sup> ALEXANDRIA TUCKER, CLIFFORD WILL, University of Florida — To date, gravitational wave detections have been limited to those from quasi-circular binary mergers. However, a significant percentage of mergers could have measurable residual eccentricities, resulting from either external perturbations of the system or short timescales between formation and merger of the binary. Understanding how the orbits of such binaries evolve could aid in creating useful eccentric gravitational waveform templates as well as provide astrophysical information about the environment and formation channels of these systems. We have analyzed the long-term evolution of non-spinning, highly eccentric binaries of general mass ratios, incorporating gravitational radiation reaction at 4.5 post-Newtonian order, including leading tail effects. We have developed accurate analytic expressions for the binaries eccentricity and total inspiral time as a function of its late-time gravitational wave frequency, and of its initial energy and angular momentum. We will discuss our results and their implications for eccentric binary gravitational wave detection.

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Alexandria Tucker  
University of Florida

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