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Distinguishing Black Hole Binary Formation Channels With Eccentricity Measurements and Other New Gravity Wave Probes NICHOLAS DEPORZIO, Harvard University, ALEXANDRA SHELEST, Ecole Polytechnique Federale de Lausanne Lausanne, ZHONG-ZHI XIANYU, Tsinghua University, LISA RANDALL, Harvard University — Now that we are in a new era of gravitational wave detection it is worth asking how far we can take these measurements in searching for new physics. But to do so we also want to better understand the signals we do see. One outstanding question is the origin of binary black holes. By studying the effects of binary eccentricity on measurements at current and future gravitational wave detectors, we can shed light on the environment in which the black holes were created. We also argue for other interesting measures of the black hole environment and discuss how future gravity wave experiments could probe dark matter or physics associated with the electroweak scale.

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