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Using Gravitational Waves from Intermediate Mass Black Holes to Test the No Hair Theorem JAMES GRABER, LC — We used to think that supermassive black holes (SMBHs) were rare, perhaps only occurring in quasars. Now we think they are common, occurring in almost every galaxy. A similar change of opinion may soon occur concerning intermediate mass black holes (IMBHs), whose very existence is still in doubt. However, some evidence suggests there may be at least several IMBHs in every galaxy and other evidence suggests that IMBHs are frequent in globular clusters. If so, IMBH-SMBH mergers may be the most common high signal-to-noise ratio BH-BH merger events seen by LISA. It turns out that these intermediate mass ratio inspirals (IMRIs) can be used to make a very clean test of the black hole no-hair theorems by means of Ryan's method. (Ryan, F. D., *Phys. Rev. D* **52**, 5707 (1995).) In this paper, we discuss using IMRIs to make this test. IMRIs may be easier to detect than extreme mass ratio inspirals (EMRIs) because they will have a higher signal to noise ratios than EMRIs at a comparable distance. The measure and dimensionality of the search space necessary to find EMRIs in the LISA data may also be significantly smaller than the search space necessary to find EMRIs, making them easier to find in the first place, and easier to analyze in the second place. We point out how to take advantage of these facts by focusing on gravitational waves from relatively early in the IMRI inspiral.

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