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**Pablo Laguna\*** ([pablo@astro.psu.edu](mailto:pablo@astro.psu.edu)), Department of Astronomy & Astrophysics, 525 Davey Laboratory, Penn State University, University Park, PA , and **Deirdre M Shoemaker** ([deirdre@gravity.psu.edu](mailto:deirdre@gravity.psu.edu)), Department of Physics, 104 Davey Laboratory #106, Penn State University, University Park, PA. *Binary Black Hole Simulations and the Hunt for Gravitational Waves.*

A new window in astronomy will open once gravitational-wave interferometers detect "first light." These detectors will give us a revolutionary view of the Universe, complementary to the electromagnetic perspective. The detection and characterization of gravitational waves is a formidable undertaking, requiring innovative engineering, powerful data analysis tools and careful theoretical modeling. Binary black holes are expected to be one of the primary sources of gravitational radiation. This talk reviews latest developments to numerically simulate binary black holes based on the BSSN formulation of the Einstein equations and the "moving puncture" recipe to model black hole singularities. The talk will also address the potential role that these simulations have of assisting us in exploring where and how gravitational wave observations can enhance our understanding of astronomical phenomena and gravity. (Received September 27, 2006)