1125-35-976 **Lydia R. Bieri*** (`lbieri@umich.edu`), University of Michigan, Department of Mathematics, East Hall, Ann Arbor, MI 48109. *Black hole formation and stability: a mathematical investigation.*

The dynamics of the Einstein equations feature the formation of black holes. The latter are related to the presence of trapped surfaces in the spacetime manifold. The mathematical study of these phenomena has gained momentum since D. Christodoulou's breakthrough result proving that in the regime of pure general relativity trapped surfaces form through the focusing of gravitational waves. (The latter were observed for the first time last year by LIGO.) The proof combines new ideas from geometric analysis and nonlinear partial differential equations (pde) as well as it introduces new methods to solve large data problems. These methods have many applications beyond general relativity. D. Christodoulou's result was generalized by S. Klainerman and I. Rodnianski. In this talk, we investigate the dynamics of the Einstein equations, focusing on these works. Moreover, we address the question of stability of black holes and what has been known so far, involving recent works of many contributors. (Received September 13, 2016)