

*B. Buffoni – B. Dacorogna – J. Krieger - H.M Nguyễn – Mathematics Section*

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## SEMINAIRE D'ANALYSE

➤ **MERCREDI 3 OCTOBRE 2018 à 14:15 - SALLE MA A1 10**

**Prof. Lydia BIERI**

*(UMichigan Ann Arbor, USA)*

donnera un séminaire sur le thème :

**« THE EINSTEIN EQUATIONS AND GRAVITATIONAL WAVES »**

Abstract:

In Mathematical General Relativity (GR) the Einstein equations describe the laws of the universe. This system of hyperbolic nonlinear pde has served as a playground for all kinds of new problems and methods in pde analysis and geometry. A major goal in the study of these equations is to investigate the analytic properties and geometries of the solution spacetimes. In particular, fluctuations of the curvature of the spacetime, known as gravitational waves, have been a highly active research topic. In 2015, gravitational waves were observed for the first time by Advanced LIGO (and several times since then). These waves are produced during the mergers of black holes or neutron stars and in core-collapse supernovae. Understanding gravitational radiation is tightly interwoven with the study of the Cauchy problem in GR. I will talk about the Cauchy problem for the Einstein equations, explain geometric-analytic results on gravitational radiation and the memory effect of gravitational waves, the latter being a permanent change of the spacetime. We will connect the mathematical findings to experiments. There is a significant difference between isolated systems and cosmological questions in GR. I will also address my recent work on various asymptotically-flat spacetimes describing isolated systems and joint work with David Garfinkle and Nicolas Yunes on gravitational radiation in cosmological spacetimes.

In the first talk, I will give an introduction into the Cauchy problem of GR as well as an overview of the most important recent results. In the following talks, we will present more details on the above topics and also discuss two analogues of memory outside GR that I found with David Garfinkle for the Maxwell equations.

Lausanne, le 2 octobre 2018  
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Les séminaires qui ont lieu à la Section de Mathématiques sont annoncés sur Internet  
<http://memento.epfl.ch/math/>