

# Eugene Wigner Colloquium

*joint event of GRK 1558 and SFB 910*



## Dr. Eric Alamou

Université Nationale des Sciences, Technologies, Ingénierie et Mathématiques (UNSTIM), Benin

### “Hydrological Modelling Based on the Principle of Least Action: Application to the Rain Flow”

The existence of many conceptual and lumped empirical hydrological models is nowadays widely recognized. However the high number of free parameters and the lack of adequate field data, lead to uncertainties in the predictions. The physics-based models derived from conservation laws are in turn more demanding in data quality and quantity. One of the problems facing modeller in that case is to account for heterogeneities of the medium at all scales, from the point scale (which is the level of validity for Saint-Venant and/or Darcy equations), to basin scale and throughout different scales of macro pores. In this context, we investigate a new modelling approach based on the Physics Principle of Least Action (MODHYPMA). This new approach requiring only few free parameters rest on the fundamental idea of Noether's theorem, whereby conservation laws are related to invariance properties of the given action functional. A corresponding hydrological Lagrangian is derived from the conservation laws of mass and momentum. The development of the model leads to previous empirical and conceptual results which were introduced in an ad hoc way by many authors. The improved version of the model MODHYPMA was applied on 20 sub-catchments in Africa and the USA. Its performance was compared with two well-known lumped conceptual models, GR4J and HBV.

---

**Thursday, 26.10.17 · 17:00h · EW 202**

Technische Universität Berlin · Institut für Theoretische Physik · Hardenbergstraße 36 · 10623 Berlin  
[www.itp.tu-berlin.de/grk1558](http://www.itp.tu-berlin.de/grk1558) · [www.itp.tu-berlin.de/sfb910](http://www.itp.tu-berlin.de/sfb910)

**GRK1558**  
research training group