Dynamics of Circle Mappings

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In these lectures we discuss dynamical systems acting on the circle. After introducing some basic combinatorial facts (already known to Poincaré), such as the notion of rotation number and its connection with the theory of continued fractions, we present some classical results due to Denjoy. We then move on to the study of rigidity of circle diffeomorphisms, discussing some of the main ideas in the Arnold-Herman-Yoccoz theory. Finally, we focus on rigidity problems for smooth circle homeomorphisms with a finite number of critical points, presenting some fundamental tools coming from Renormalization Theory and Holomorphic Dynamics.

Prerequisites: The prerequisites are a good course in Real Analysis (including Metric Spaces, Measure Theory and basic Functional Analysis) in addition to basic notions of Ergodic Theory and Dynamical Systems. For the last couple of lectures, some basic Complex Analysis will be needed as well.