Thursday June 11, 15:50-16:30:

SPEAKER: **Romain Brasselet (SISSA, Trieste)**

TITLE: " **Isometric representation of sensory stimulations by the temporal structure of neural activity"**

ABSTRACT**:**

Sensory neural activity mediates all perceptions and must thus provide an efficient representation of the environment. In particular, the firing dynamics of population of neurons has to be such that the central nervous system can recognize the stimulation that elicited it. One crucial feature of the code is that it must be unambiguous, meaning that two different stimulations cannot elicit the same pattern of activity. Such a feature allows a recognition of the stimulation provided templates exist. However, given the complexity of the manifold of stimulations, there is a need for a capacity to recognize a continuum of stimulations. It still remains unclear how the decoding task can be carried to the level of an infinite number of possible contexts. Here, using data from human tactile microneurography, we show that, if readout in an efficient way, peripheral activity is unambiguous at the utmost point. We show that properly tuned decoders can capture some geometrical regularities of the input space encoded by primary afferent spiking signals. This provides strong evidence that the neural activity can be endowed with a geometry that mimics that of the tactile stimulations. We argue here that such a faithful geometric organisation may be crucial in order to understand human cognitive abilities such as learning, generalizing and categorizing. Our results also suggest that while first-spike latencies are enough to guarantee maximum information transmission of tactile stimuli, entire primary spike trains constitute a necessary condition to encode isometric input-output mappings, a likely basis for generalization in sensory coding. Thus, spikes gradually shape the representation of the stimulation until a faithful one is attained.