

**Graz Advanced School of Science**  
PHYSICS COLLOQUIUM OF THE UNIVERSITY OF GRAZ AND  
THE GRAZ UNIVERSITY OF TECHNOLOGY

**Bernat Corominas Murtra**

Institute of Biology - University of Graz

**Topological transitions and cell-cell adhesion properties  
in biological development**

**Abstract:**

The biological developmental process —the process that starts with one fertilized cell and ends with the fully developed individual— implies precise but significant changes in the geometry and structure of the embryonic tissues. Recent results show that apparently minor changes in adhesion at the local level of cell-cell contacts trigger deep, non-linear transitions in the topological organization of the whole embryonic tissue and, in consequence, change its material properties and facilitate geometrical deformations. Open questions remain, like the potential existence of causal feedbacks between cell differentiation processes and the potential heterogeneity of topological patterns existing within the tissue. The results presented in this talk are based on the fundamental assumption that predictive frameworks in theoretical biology must explore the connection between different scales of the system. In this particular case, we use topology to establish a bridge between the system's scales defined by i) the cell level and ii) the tissue level. This enables us to predict global, non-trivial behaviours in tissues from the empirically feasible observables related to the mechanical properties of single cells.

**Date:** Tuesday, March 7, 2023, 16:15

**Location:** Lecture Hall 05.01, Institute of Physics, University of Graz, Universitaetsplatz 5

**Host:** A. Goritschnig

For a regularly updated colloquium program see: <https://www.if.tugraz.at/workshops/abstracts.php?257>