1135-68-1328   **Anastasiia Varava***, Teknikringen 14, Stockholm, 11428. *Topological and Geometric Methods in Robotic Manipulation and Path Planning.* Preliminary report.

In this talk, I will present our work on designing algorithms for robotic manipulation and path planning. In robotic manipulation, one says that an object is caged when it cannot escape arbitrarily far from its initial position, or, formally, when it lies in a compact connected component of the collision-free subspace of its configuration space. To derive sufficient conditions for objects to be caged by different types of robotic manipulators, we use two different approaches. The first is based on shape analysis: we consider partially deformable objects with specific shape features such as narrow parts, formalize their deformations as isotopies, abstract the manipulator as a closed curve, and use the concept of linking number to verify if the object is caged by the manipulator. The second approach relies on approximating the collision space of the object by an alpha complex and computing the path-connected components of its complement. This approach is also applicable to proving path non-existence between disjoint collision-free configurations of rigid objects and robots, which is an important problem in path planning. (Received September 21, 2017)