**Name of the Host Laboratory** | Computer Science Laboratory (LIX), Ecole Polytechnique  
**Website of the Host Laboratory** | [https://www.lix.polytechnique.fr](https://www.lix.polytechnique.fr)  
**Internship Supervisor** | Sergio Mover ([http://sergiomover.eu](http://sergiomover.eu))  
**Internship Subject** | Automatic refinement of qualitative abstractions for dynamical systems.  
**Student’s level** |  
- ✓ Advanced Undergraduate Students (3rd or 4th year)  
- ✓ Master’s students (1st or 2nd year)  
- ✓ PhD students  
**Proposed Duration** |  
- □ 3 months  
- □ 4 months  
- □ 5 months  
- □ 6 months  
**Prerequisites** | The students should have a background in Computer Science or Mathematics and some background in mathematical logic. The student should also have a solid programming experience. A plus is some previous experience with formal methods (e.g., abstract interpretation, model checking, theorem proving, SMT)  
**Internship description (max. 15 lines)** | Cyber-Physical Systems (CPS) are formed by digital components (i.e., computers) interacting with the physical environment (i.e., moving a robot arm, operating a chemical plant). Examples of CPS are autonomous vehicles (e.g., self-driving cars or drones) and medical devices (e.g., pacemakers, insulin pumps...). Formal verification can find mistakes in the early design of a CPS, avoiding additional costs in the later implementation and deployment phases. The goal of this internship is to develop an automatic verification algorithm for subclass of CPS. In particular, the student will focus on the automatic abstraction-refinement for polynomial dynamical systems. The work includes both a theoretical part and an implementation/evaluation part. Keywords: formal methods, automated reasoning, dynamical systems.  

The boxes marked with cross implies eligible