

# Colloquium

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Unless stated otherwise, colloquia are scheduled for Thursdays 4:00-5:00pm in WH-100E with refreshments served from 3:45-4:00 pm in WH-102.

Organizers: Michael Dobbins, Vladislav Kargin, Cary Malkiewich, Adrian Vasiu, and Emmett Wyman

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## Fall 2025

**Thursday Nov 6 4:00-5:00pm, WH-100E**

Speaker: **Andrew Obus** (CUNY)

Topic: ***The lifting problem for covers of curves, particularly its group-theoretical aspects***

**Abstract:** Whenever a mathematical object is given in characteristic  $p$ , one can ask whether it is the reduction, in some sense, of an analogous structure in characteristic zero. If so, the structure in characteristic zero is called a “lift” of the structure in characteristic  $p$ . The most famous example is Hensel’s Lemma about lifting solutions of polynomials in  $\mathbb{Z}/p$  to solutions in the  $p$ -adic integers  $\mathbb{Z}_p$ .

The “lifting problem” we consider is more geometric: given a smooth curve  $X$  in characteristic  $p$  with an action of a finite group  $G$ , is there a curve in characteristic zero with  $G$ -action that reduces to  $X$ ? Unsurprisingly, the answer is related to the group theory of  $G$  (for instance, if  $p$  does not divide  $|G|$  or if  $G$  is cyclic, then the curve with the  $G$ -action always lifts, but if  $G$  has an abelian, non-cyclic, non- $p$ -subgroup that fixes a point on  $X$ , then the curve does not lift with the action). After giving an introduction to the lifting problem and some examples, we will discuss well-established ways that the problem interacts with group theory, as well as more recent advances relating the problem to representation theory.

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Last update: **2025/11/03 19:38**