

# ***ALGEBRAIC GEOMETRY AND COMMUTATIVE ALGEBRA SEMINAR***

**Speaker: Alessandra Costantini**

**Oklahoma State University**

**Date:** Thursday, August 31, 2023

**Time:** 3:30 PM

**Location:** 258 Hurley Hall

**Zoom URL:** NA



***Lecture Title:***

**Rees algebras of linearly presented ideals**

***Abstract***

The Rees algebra of an ideal  $I$  is an invaluable tool in the study of the algebraic properties of  $I$ , as it encodes information on the asymptotic growth of the powers of  $I$ . Moreover, as  $\text{Proj}(\mathcal{R}(I))$  is the blowup of an affine scheme along  $V(I)$ , Rees algebras represent an essential tool in the study of singularities. As the blowup construction describes  $\text{Proj}(\mathcal{R}(I))$  via parametric equations, a fundamental problem is to find the implicit equations of blowups. This is a difficult problem in general, as a priori one would need to determine all possible relations among the generators of all powers of  $I$ . In this talk, I will restrict to the case when  $I$  is a codimension-two perfect ideal in a polynomial ring  $k[x_1, \dots, x_d]$ , admitting a presentation matrix consisting of linear entries. Most of the existing literature in this setting assumes the so-called  $G_d$  condition that the Fitting ideals  $\text{Fitt}_i(I)$  have codimension at least  $i+1$  for  $i=1, \dots, d-1$ . Moving away from this assumption, we determine the defining ideal of the Rees algebra of  $I$  by requiring only that this codimension constraint is satisfied for  $i=1, \dots, d-2$ . This is part of joint work with Edward Price and Matthew Weaver.