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**Title:** The Quot scheme  $\text{Quot}^l(E)$

**Abstract:** Grothendieck's Quot schemes — moduli spaces of quotient sheaves — are fundamental objects in algebraic geometry, but we know very little about them. This talk will focus on a relatively simple special case: the Quot scheme  $\text{Quot}^l(E)$  of length  $l$  quotients of a vector bundle  $E$  of rank  $r$  on a smooth surface  $S$ . The scheme  $\text{Quot}^l(E)$  is a cross of the Hilbert scheme of points of  $S$  ( $E = \mathcal{O}$ ) and the projectivisation of  $E$  ( $l = 1$ ); it carries a virtual fundamental class, and if  $l$  and  $r$  are at least 2, then  $\text{Quot}^l(E)$  is singular. I will explain how the ADHM description of  $\text{Quot}^l(E)$  provides a conjectural description of the singularities, and show how they can be resolved in the  $l = 2$  case. Furthermore, I will describe the relation between  $\text{Quot}^l(E)$  and  $\text{Quot}^l$  of a quotient of  $E$ , prove a functoriality result for the virtual fundamental class, and use it to compute certain tautological integrals over  $\text{Quot}^l(E)$ .