1163-11-753 **Zachary L Scherr*** (scherr@susqu.edu) and **Katherine Thompson** (kthomps@usna.edu).
Integral Polynomial Pell Equations.

In his work on the Pell equation, Euler discovered several interesting polynomial identities included among them that $(2n^2+1)^2-(n^2+1)(2n)^2=1$ for every n. Motivated by Euler's examples, one can ask whether it is possible to classify all such identities. In particular, for which polynomials $d(x) \in \mathbb{Z}[x]$ do there exist non-trivial solutions to $f(x)^2-d(x)g(x)^2=1$ with $f(x), g(x) \in \mathbb{Z}[x]$? Yokota and Webb classified all such quadratic $d(x)$ and asked about the situation with $d(x)$ of degree at least 4. In this talk we'll classify all monic, quartic, $d(x)$ which give rise to non-trivial solutions to Pell's equation. In particular, we'll show that other than the previously known examples there is exactly one infinite family of such $d(x)$. The resolution of this problem is connected to work by Mazur and Kubert on rational torsion points on elliptic curves over $\mathbb{Q}$. (Received September 12, 2020)