1145-11-2273 **Jackson Salvatore Morrow*** (`jmorrow4692@gmail.com`), 400 Dowman Drive, Atlanta, GA 30022. *Composite level images of Galois and Entanglement fields.*

Let E be an elliptic curve defined over $\mathbf{Q}$ without complex multiplication. For each prime ℓ, there is a representation $\rho_{E,\ell}\colon \mathrm{Gal}(\overline{\mathbf{Q}}/\mathbf{Q}) \to \mathrm{GL}_2(\mathbf{Z}/\ell\mathbf{Z})$ that describes the Galois action on the ℓ-torsion points of E. This representation is called the mod ℓ image of Galois.

In this talk, I will discuss what happens when one considers composite level images of Galois. In particular, I will introduce composite level modular curves whose rational points classify elliptic curves over $\mathbf{Q}$ with simultaneously non-surjective, composite image of Galois. I will also describe techniques used to provably find the rational points on these curves, which yield results concerning when composite level images of Galois occur.

Finally, I will give an application of our results to the study of entanglement fields and present non-CM elliptic curves with peculiar division fields. Some of the results I will talk about are joint work with Catalina Camacho, Wanlin Li, Jack Petok, and David Zureick-Brown. (Received September 25, 2018)