Title: Certain eta-quotients and ℓ-regular overpartitions.

Abstract: In 2003, Lovejoy introduced the notion of ℓ-regular overpartition $\overline{A}_\ell(n)$, which counts the number of overpartitions of n into parts not divisible by ℓ. In this talk we show that the arithmetic density of the set $\left\{n \in \mathbb{Z}_{\geq 0} : \overline{A}_\ell(n) \equiv 0 \pmod{p^j}\right\}$ is exactly 1; if $p_i^{2a_i} \geq \ell$, where j is a fixed positive integer and $\ell = p_1^{a_1} p_2^{a_2} \dots p_m^{a_m}$ with primes $p_i > 3$. We also exhibit infinite families of congruences and multiplicative identities for $\overline{A}_5(n)$. In particular, for any positive integer k and prime number $p \equiv 3 \pmod 4$, we prove that:

$$\overline{A}_5\left(4p^{2(k+1)}n + 4p^{2k+1}j + p^{2(k+1)}\right) \equiv 0 \pmod 8,$$

where $j \not\equiv 0 \pmod p$. This is a joint work with Prof. Kalyan Chakraborty.