

1023-11-890

**Michael P. Knapp\*** (mpknapp@loyola.edu), Mathematical Sciences Department, Loyola College, 4501 North Charles Street, Baltimore, MD 21210-2699. *Systems of diagonal forms over  $p$ -adic fields*. Preliminary report.

In this talk we consider systems of diagonal forms with integer coefficients. It is known that every such system has a nontrivial simultaneous zero in every  $p$ -adic field  $\mathbb{Q}_p$  provided only that the number of variables is sufficiently large in terms of the degrees. A theorem due to Lewis & Montgomery shows that the number of variables required grows at least exponentially as the degrees and number of forms increase. However, a theorem of Ax & Kochen says that if  $p$  is sufficiently large then only a small polynomial bound is required to ensure that nontrivial zeros exist over  $\mathbb{Q}_p$ . In this talk, we explore the question of how small we can make the prime  $p$  and still have a polynomial bound. In particular, we show that polynomial bounds exist whenever  $p$  is larger than the largest of the degrees and usually even when  $p$  is significantly smaller. (Received September 22, 2006)