1016-11-317 **Michael P. Knapp*** (mpknapp@loyola.edu), Mathematical Sciences Department, Loyola College, 4501 North Charles Street, Baltimore, MD 21210-2699. *Systems of many diagonal forms of different degrees over p-adic fields.*

In this talk we consider systems of diagonal forms with integer coefficients in which each form has a different degree. It is known that every such system has a nontrivial zero in every p-adic field $\mathbb{Q}_p$ provided 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 we may allow p to be smaller than the largest of the degrees. (Received February 14, 2006)