

# SEMINÁRIO DE TEORIA DOS NÚMEROS

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## *Systems of quadratic forms over Fields*

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Resumo: An important problem in the theory of quadratic forms over fields is to determine if a quadratic form has a nontrivial zero over the field. The problem is especially interesting over fields that occur in algebraic number theory and algebraic geometry. Namely, finite fields,  $p$ -adic fields, number fields, the real and complex numbers, and function fields over each of these fields.

It is frequently the case that a quadratic form is guaranteed to have a nontrivial zero over a field if the quadratic form has sufficiently many variables, where "sufficiently many" depends on some arithmetic property of the field.

Perhaps unexpectedly, it is very useful to study the same question for systems of quadratic forms. Knowing when a system of quadratic forms with coefficients in a field  $K$  is guaranteed to have a nontrivial zero often yields information about the same question for algebraic extensions of  $K$  and function fields over  $K$ .

In this talk I will review the basics of these ideas and state some known results for some of the fields above. I will focus on a problem that proved to be very difficult. Namely the case of systems of quadratic forms over  $p$ -adic fields. I will give previous results on this problem and then talk about a new way to study systems of quadratic forms over complete discretely valued fields, which are generalizations of  $p$ -adic fields.