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Raman Parimala*, Emory University, Department of Mathematics, Atlanta, GA. *Arithmetic of linear algebraic groups over two dimensional geometric fields.*

The Hasse principle for number fields states that every principal homogeneous space under a semisimple simply connected linear algebraic group defined over a number field has a rational point provided it has a rational point over every completion at real places of the number field. This is a theorem due to Kneser for classical groups (60's), Harder for all exceptional groups of type other than E_8 (60's) and Chernousov for the case E_8 (in the 80's). The Hasse principle implies that principal homogeneous spaces under a semisimple simply connected linear algebraic group defined over a totally imaginary number field have rational points. Already in the 60's, Serre posed a far-reaching generalisation of this conjecture, now known as Conjecture II: every principal homogeneous space under a semisimple simply connected linear algebraic group defined over a perfect field of cohomological dimension 2 has a rational point. Fields of cohomological dimension 2 includes totally imaginary number fields, p-adic fields and function fields of surfaces over algebraically closed fields. In this talk, we shall trace progress towards this conjecture over the last two decades. (Received April 10, 2008)