Chandan Singh Dalawat

Research Summary:

The Stickelberger-Hensel congruence on discriminants was extended to the relative situation, thereby sharpening the results of Fröhlich. By analogy, it was shown that discriminants of elliptic curves over local fields do not satisfy any such congruence condition.

For a finite extension K of $\mathbf{Q}_p$, specified the $\mathbf{F}_l$-line in $K^\times/K^{\times l}$ which corresponds, via Kummer theory, to the unramified degree-l extension of K when $K^\times$ has an element of prime order l. This turned out to be the local counterpart of results of Hecke, which are immediate corollaries.

Introduced the notion of the idélic discriminant for elliptic curves $E|K$ over number fields — which turned out to have been anticipated by Silverman —, following Fröhlich who treated extensions $L|K$ of number fields, and found a criterion for a given K-basis of L, or a given weierstrassian cubic defining $E|K$, to be everywhere locally minimal.

Publications:

1. *Congruent numbers, elliptic curves, and the passage from the local to the global*, to appear in the Proceeding of the Ramanujan Mathematical Society workshop, Hyderabad, 3–5 July 2005.

Conferences/Workshops Attended:

1. *Recent developments in the arithmetic of Shimura varieties and Arakelov geometry*, Barcelona, 10–15 July, 2006.

2. *Autour des motifs*, Bures-sur-Yvette, 17–30 July, 2006.

3. *International conference on Arithmetic Algebraic Geometry*, El Escorial, 4–8 September, 2006.

4. *Indo-UK conference on Number Theory*, Madras, 18–23 September, 2006.

5. *p-adic Arithmetic Geometry*, Kyoto, 20–22 November, 2006.

Visits to other Institutes:

1. Tata Institute of Fundamental Research, Bombay, 25–30 June, 2006.

2. Institut des Hautes Études scientifiques, Bures-sur-Yvette, 1–8 August, 2006.

3. Research Institute for Mathematical Sciences, Kyoto, 8–24 November, 2006.

4. Indian Statistical Institute, Bangalore, 4–11 February, 2007.

Invited Lectures/Seminars:

1. *Congruent numbers*, Visiting students' summer programme, Allahabad, 12 June 2006; Visiting students' research programme, Bombay, 27 June 2006; Ramanujan mathematical society workshop, Hyderabad, 3–5 July, 2006; Harish-Chandra's birthday celebration, Allahabad, 11 October 2006.

2. *Basic arithmetic*,Ramanujan mathematical society workshop, Hyderabad, 3–5 July, 2006.

3. *Congruent numbers and the passage from the local to the global*, Colloquium at the Indian Statistical Institute, Bangalore, 6 February 2007; Colloquium at the Indian Institute of Science, Bangalore, 9 February 2007.

4. *Discriminants*, Harish-Chandra research institute, Allahabad, 21 March, 2007.

Other Activities:

Supervised a summer student who studied Tate's computation of $K_2(\mathbf{Q})$. Discussed discriminants and local fields with a post-doctoral fellow from Bombay.