Lecture at Delhi:

Date: To be announced

Title: Generalized Hexagons and Singer Geometries

Abstract:

Recognizing specific geometric structures by certain properties - preferably as weak as possible - is very important in finite geometry, since various configurations can turn up in completely different contexts. Data that are available for structures in projective spaces are in many situations the intersection numbers with respect to subspaces. Our aim is to characterize the standard embeddings of the split Cayley hexagon $H(q)$ in $\mathrm{PG}(5, q)$, with q even, and in $\mathrm{PG}(6, q)$, by intersection numbers. Since in these representations the points of $H(q)$ are all the points of $\mathrm{PG}(5, q)$, respectively all the points of a parabolic quadric of $\mathrm{PG}(6, q)$, such a characterization is impossible if we only consider intersections of the point set of the hexagon with subspaces. That is why we consider intersections of subspaces with the line set of $H(q)$. We obtain very strong results, several of them brand new. Also, a new type of geometry turned up, and these geometries will be called Singer geometries.

Lecture at Kolkata:

Date: To be announced

Title: Finite Fields and Galois Geomtries

Abstract:

In 1954 Segre proved the following celebrated theorem : *In* $\mathrm{PG}(2, q)$, *with* q *odd, every oval is a nonsingular conic.* Crucial for the proof is Segre's *Lemma of Tangents* where a strong result is deduced from the simple fact that the product of the nonzero elements of $\mathrm{GF}(q)$ is -1. Relying on this Lemma of Tangents he was able to prove excellent theorems on certain pointsets in $\mathrm{PG}(2, q)$. To this end he also generalized the classical theorem of Menelaus to an arbitrary collection of lines in the plane $\mathrm{PG}(2, q)$, no three of which are concurrent. As a corollary of these theorems good results on linear MDS codes were obtained. Here we review generalizations of the Lemma of Tangents, generalizations of Segre's generalization of the theorem of Menelaus, and applications to Hermitian curves, semiovals, circle geometries and linear MDS codes. Finally we report on recent research about generalized ovals : the elements of a generalized oval are subspaces of a projective space. To do this an appropriate 'Lemma of Tangents type theorem is proved.

Lecture at Bangalore:

Date: 3.30 pm on January 31, 2008 (Thursday)

Title: Generalized Hexagons and Singer Geometries

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