IMSA
Seminars & Colloquium

April 12, 2023
at 5:00 pm
&
April 13, 2023
at 5:00 pm

Ungar Bldg.,
Room 528-B

Professor Alexei Kovalev
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Coassociative fibrations.

The Euclidean space **R**^7 possesses some amazing geometrical features as it is a unique higher-dimensional vector space admitting a structure akin to the vector product in **R**^3. As a particular attribute, this so-called G_2 structure allows us to define some intriguing submanifolds.

One class of such submanifolds is known as co-associative 4-folds.

Remarkably, it can be shown that these coassociative submanifolds are volume-minimizing among all nearby submanifolds if the respective G_2 structure is torsion-free. In particular, this bears an analogy to special Lagrangian submanifolds of Calabi—Yau manifolds.

I will explain the role of differential forms in setting up a G_2 geometry in 7 dimensions and the deformation theory of coassociative submanifolds.

Then I will give informal description of different constructions of examples where the deformation family "fills" the ambient 7-manifold *M*, thereby defining a fibration of *M* by coassociative submanifolds (with some singular fibres).

On nearly parallel G_2-manifolds.

A nearly parallel G_2 structure on a 7-manifold can be given by a 3-form φ of special algebraic type satisfying a differential equation $d\varphi = \tau * \varphi$ for a non-zero constant τ. We consider nearly parallel G_2 structures on the Aloff—Wallach spaces and on regular Sasaki—Einstein 7-manifolds. We give a construction and explicit examples of associative 3-folds (a particular type of minimal submanifolds) in these spaces. Joint work with M. Fernández, A. Fino and V. Muñoz.

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