Summary Session :-

Main Themes :

5 categories

1. Instantons
2. Symmetries
3. Special Structures
4. Geometric Flows
5. Calibrated submanifolds.

1. Instantons

- **Goncalo** — DT-instantons on almost complex 6 manifolds.

  Key result :- classification of invariant examples on $\mathbb{F}_2$ for two standard complex structures.

- **Ragini**

  Deformation of G_2-instantons on nearly G_2 manifolds $+$ SU(3)-instantons on Sasaki-Einstein 7-manifolds.

Key result :- Deformation space of the canonical
connection for homogenous nearly G_2.

- Joe

  • Deformation theory of G_2 instantons on AC G_2
  manifolds.

  Key result :- Local uniqueness for standard G_2
  instanton on $\mathbb{R}^7$.

- Daniel

  • Construction of G_2 instantons on Joyce-Karigiannis
  G_2 manifolds.

  ↝ fantasies about $S^1 \times CY3$ and relations b/w
  G_2 instantons & stable bundles.

  2. <u>Symmetries</u> :→

- Thomas Madsen   Toric $\left(T^3/T^4\right)$ $G_2/Spin(7)$
                            manifolds.

Key things :- multi-moment maps & trivalent
              graphs in $\mathbb{R}^3$.

- <u>Alberto</u>   Studied Aut (M^7, φ) , M compact , $d\varphi = 0$

     $\leadsto$ no non-trivial homogeneous cohomogeneity
one examples.

     - Left-invariant $d\varphi = 0 \leadsto$ examples of unimodular
     but not solvable. Classification result.
          $\leadsto$ exact G_2 structures but no compact quotients.

- <u>Fabian</u>   examples of cohomogeneity one $G_2/Spin(7)$

manifolds which are   AC or ALC.

- <u>Kael</u>   Toric $(\mathbb{T}^3)$ nearly Köhler 6-mflds.
     Study of $S^3 \times S^3$ example and a local descript-
     -ion of all such thing as a 2nd order non-linear
PDE.

                3.   <u>Special Structures</u>

- <u>Lucia</u>   Spinorial Classification of Spin(7) structures.

$\leadsto$ Balanced condition $\iff$ harmonic
                              spinors.

• Balanced Spin(7) of the form $N^R \times \Gamma^{8-R}$

                                      Nilmanifold

                                      $k = 5$ or 6.

case $R = 5$:− classification

       $R = 6$:$\to$ examples ; complete classification
                                NOT yet.

• Gavin   Quadratic closed G_2 structures.

           $\leadsto$ $U(2)_{\pm}$ stabilizers.

(examples of) • Extremally Ricci-pinched closed G_2
                               structures

             • Weirstrass formulae
             • semi-flat Γ^4-fibrations.
                 (maximal spacelike in quadrics
                     in $\mathbb{R}^{3,3}$).
            • Laplacian solitons including gradient
             examples.

4. Geometric Flows

- <u>Ben</u> G_2 laplacian flow on $\mathbb{P}^4 \times \Omega^3$,

  semi-flat coassociative fibration

  $$\updownarrow \text{ related}$$

  spacelike Mean curvature flow in $\mathbb{R}^{3,3}$.

- long-time existence for $\Omega = \mathbb{R}^3$ w/ any initial condition.

- <u>Udhav</u> S^1 invariant G_2 Laplacian flow

  $\longleftrightarrow$ coupled system for $SU(3)$-structures

  & connections on S^1-bundle.

  $\sim$ looked at Bryant/Fernández example

  $$\mathbb{P}^4 \longrightarrow M^7$$
  $$\downarrow$$
  $$\mathbb{P}^3$$
  , symplectic form is constant ; almost complex structure degenerates.

  $\sim$ looked at $\mathbb{R}^+ \times \mathbb{P}^2 \longrightarrow N^6$
  $$\downarrow \mathbb{T}^4$$

; S^1 quotient is Kähler and the Kähler property is preserved along the flow.

- <u>Shubham</u> — Isometric flows of G_2 structures. (tomorrow)

5. <u>Calibrated submanifolds</u>

- <u>Ben Aslan</u> • Pseudoholomorphic curves in Nearly-Kähler 6 manifolds, especially twistor spaces.

  $\leadsto$ Classification of S^1-invariant pseudoho-
  -lomorphic curves in nearly Kähler $\mathbb{CP}^3$.

- <u>Chung-Jun</u>   minimal S^2 ie Atiyah-Hitchin manifold. $\leadsto$ area minimizing, unique compact, minimal submanifold of dim 2 or 3.
  $\leadsto$ stable under MCF.

- _Jesse_ — Associative / Coassociative submanifolds
  & minimality. (tomorrow)