# III Workshop de Verão em Matemática da UAMAT-UFCG

## (09 a 11 de Fevereiro de 2021)

Sessão técnica:

### *Geometria Diferencial*

Responsáveis:

*Kennerson Nascimento de Sousa Lima e Marco Antonio Lázaro Velásquez*

# Cronograma

| Horário | Palestrante |
|---|---|
| **09/02/2021**<br>**14:00 – 14:50** | **André Felipe Araújo Ramalho** (UFCG)<br>Link de acesso (via Google Meet): |
| **09/02/2021**<br>**15:00 – 15:50** | **Francisco Vieira de Oliveira** (UFERSA, Campus Angicos, Rio Grande do Norte)<br>Link de acesso (via Google Meet): |
| **10/02/2021**<br>**14:00 – 14:50** | **Antonio Caminha Muniz Neto** (UFC)<br>Link de acesso (via Google Meet): |
| **10/02/2021**<br>**15:00 – 14:50** | **Eder de Moraes Correa** (UFMG)<br>Link de acesso (via Google Meet): |
| **11/02/2021**<br>**14:00 – 14:50** | **Halyson Irene Baltazar** (UFPI)<br>Link de acesso (via Google Meet): |

# Resumos

**André Felipe Araújo Ramalho** (UFCG)

**Título:** *"Conformal Killing graphs in foliated Riemannian spaces with density: rigidity and stability"*

**Resumo:** In this talk we investigate the geometry of conformal Killing graphs in a Riemannian manifold $M_f^{n+1}$ endowed with a weight function $f$ and having a closed conformal Killing vector field $V$ with conformal factor $\psi_V$, that is, graphs constructed through the flow generated by $V$ and which are defined over an integral leaf of the foliation $V^\perp$ orthogonal to $V$. For such graphs, we establish some rigidity results under appropriate constraints on the $f$-mean curvature. Afterwards, we obtain some stability results for $f$-minimal conformal Killing graphs of $M_f^{n+1}$ according to the behavior of $\psi_V$. Finally, related to conformal Killing graphs immersed in $M_f^{n+1}$ with constant $f$-mean curvature, we study the strong stability.

---

**Francisco Vieira de Oliveira** (UFERSA, Campus Angicos, Rio Grande do Norte)

**Título: "***Estruturas quase complexas harmônicas em variedade flag"*

**Resumo:** By analysing the Ricci star tensor $Ric^\square$, we study harmonic almost complex structure in maximal flag manifolds. We show that flag manifolds have diagona $Ric^\square$ tensor. Using the concept of $*$Einstein manifolds, we study the stability of invariant almost complex structure and show examples of stables parabolic almost complex structures on maximal flag manifolds.

---

**Antonio Caminha Muniz Neto** (UFC)

**Título:** *"A maximum principle related to volume growth and applications"*

**Resumo:** In this talk, we derive a new form of maximum principle for smooth functions on a complete noncompact Riemannian manifold $M$ for which there exists a bounded vector Field $X$ such that $\nabla f, X > \geq 0$ on $M$ and $X \geq af$ outside a suitable compact subset of $M$, for some constant $a > 0$, under the assumption that $M$ has either polynomial or exponential volume growth. We then use it to obtain some straightforward applications to smooth functions and, more interestingly, to Bernstein-type results for hypersurfaces immersed into a Riemannian manifold endowed with a Killing vector field, as well as to some results on the existence and size of minimal submanifolds immersed into a Riemannian manifold endowed with a conformal vector field.

---

**Eder de Moraes Correa** (UFMG)

**Título:** *"Teoria de Gauge Abeliana em Variedades Flag Complexas e Aplicações"*

**Resumo:** No âmbito das teorias de Yang-Mills e Kaluza-Klein, o estudo de submersões Riemannianas definidas por fibrados principais desempenha um papel fundamental na construção de exemplos de métricas com propriedades especiais de curvatura. Nesta palestra, apresentaremos um método construtivo que nos permite descrever estruturas de Sasaki-Einstein em certas variedades de contato homogêneas definidas por fibrados $S^1$-principais sobre variedades flags complexas.

---

**Halyson Irene Baltazar**  (UFPI)

**Título:** "*Cosmic no-Hair Conjecture for manifolds satisfying the  zero radial Weyl curvature condition*"

**Resumo:** It was conjectured in the $80$s that the only static vacuum spacetime with positive cosmological constant and connected cosmic event horizon is the De Sitter space. In other words, the only $n$-dimensional compact static triple $\left( M, g, f \right)$ with positive scalar curvature and connected boundary is the standard hemisphere $S_{+}^{n}$. The purpose of this lecture is to prove that such a conjecture is true under the zero radial Weyl curvature condition.

---