Abstracts

María Laura Barberis
Nearly pseudo-Kähler metrics of constant sectional curvature on solvable Lie groups

Beatrice Brienza
Generalized Kähler BHE 3-folds

Andrew Clarke
Semi-stability and local wall-crossing for Hermitian Yang–Mills connections

Virginia García
Canonical splittings in naturally reductive 2-step nilmanifolds

Claudio Gorodski
Beyond polar representations

Jorge Lauret
The $(1,1)$-Aeppli cohomology and its applications to pluriclosed metrics in the compact homogeneous case

Andrei Moroianu
Weyl–Einstein structures in conformal geometry

Gabriela Ovando
On the analytical integrability of magnetic flows on compact manifolds

Marcos do Nascimento Paes
On the spectrum of 2-step nilmanifolds

Tommaso Sferruzza
Geometrically formal Hermitian manifolds

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

Nearly pseudo-Kähler metrics of constant sectional curvature on solvable Lie groups

María Laura Barberis
Universidad Nacional de Córdoba, Argentina

Abstract. The classification of 6-dimensional homogeneous nearly pseudo-Kähler (NPK) spaces with semi-simple isotropy was carried out in [AKW]. Among these spaces, there is a distinguished example which can be realized as a simply connected solvable Lie group such that the corresponding NPK metric, which is left invariant, of signature $(2, 4)$, has constant sectional curvature equal to -1.

We extend this example to a one-parameter family of (pairwise non-isomorphic) 6-dimensional simply connected solvable Lie groups whose corresponding left invariant NPK metrics still have constant sectional curvature equal to -1 and are in general not complete.

This is joint work with I. Agricola, A. Andrada and M. Schulz.

Reference

[AKW] D. V. Alekseevsky, B. S. Kruglikov, H. Winther, *Homogeneous almost complex structures in dimension* 6 *with semi-simple isotropy*, Ann. Global Anal. Geom. **46** (2014), 361–387.

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

Generalized Kähler BHE 3-folds

Beatrice Brienza
IMPA – Instituto de Matemática Pura e Aplicada, Brazil

Abstract. We introduce the notion of generalized Kähler Bismut–Hermitian–Einstein (GKBHE) manifolds, namely generalized Kähler manifolds for which both Bismut Ricci forms vanish, and we study these structures on compact threefolds. We separate the analysis in cases by the horizontal rank, an invariant taking values in $\{0, 1, 2\}$ that measures the relative position of the canonical foliations associated with the two Hermitian structures. We characterize the case of horizontal rank 0 and describe the case of horizontal rank 1, revealing its close interplay with Kähler (orbifold) surfaces admitting a Hamiltonian potential whose logarithm determines the Ricci form. This description also provides a tool for constructing new compact GKBHE threefolds.

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

Semi-stability and local wall-crossing for Hermitian Yang–Mills connections

Andrew Clarke
Universidade Federal do Rio de Janeiro, Brazil

CIEM Colloquium

Abstract. Hermite–Einstein metrics, and Hermitian Yang–Mills connections, gave some of the earliest examples in which the existence of solutions of certain geometric PDEs can be shown to be equivalent to certain numerical conditions coming from algebraic geometry. The algebraic condition, of the stability of a holomorphic vector bundle, depends on the cohomology class of the Kähler metric. In this talk we will discuss how the stability of a given holomorphic bundle can change as we change the Kähler class, primarily using analytic techniques and the relation of the HYM condition to finding the zeros of a certain moment map.

Joint work with Carl Tipler (Brest).

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

Canonical splittings in naturally reductive 2-step nilmanifolds

Virginia García
Universidad Nacional de Rosario, Argentina

Abstract. In this talk, we study the canonical connection and its holonomy on naturally reductive 2-step nilpotent Lie groups. We describe the holonomy algebra in terms of the orthogonal representation used to construct these spaces and investigate the associated canonical horizontal–vertical splittings and Riemannian submersions. We also compare the splittings arising from different intermediate Lie algebras between the holonomy algebra and the stabilizer of the torsion. Finally, we focus on the case of an abelian Lie algebra, where the horizontal holonomy modules can be characterized in terms of the linear relations among the weight vectors, and illustrate the results with examples.

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

Beyond polar representations

Claudio Gorodski
Universidade de São Paulo, Brazil

Abstract. Inspired by the theory of polar representations, we discuss other classes of geometrically interesting representations from the point of view of their orbits and of their orbit spaces.

Based on joint work with Alexander Lytchak.

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

The (1, 1)-Aeppli cohomology and its applications to pluriclosed metrics in the compact homogeneous case

Jorge Lauret
Universidad Nacional de Córdoba, Argentina

Abstract. After a full description of the $(1,1)$-Aeppli cohomology of a complex manifold that admits a transitive compact Lie group of biholomorphisms (i.e., C-spaces), we give three geometric applications:

1. Classification of pluriclosed C-spaces: products of flag manifolds and compact Lie groups.
2. Explicit description of all pluriclosed left-invariant metrics on a compact Lie group (not necessarily semisimple).
3. Global stability of Bismut flat metrics under the pluriclosed flow on compact Lie groups (neither necessarily semisimple nor necessarily left-invariant metrics).

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

Weyl–Einstein structures in conformal geometry

Andrei Moroianu
CNRS & Université Paris-Saclay, France

CIEM Colloquium

Abstract. Weyl–Einstein structures are the natural counterpart in the conformal setting of Einstein metrics from Riemannian geometry. After some preliminaries and historical background, I will present some recent results about their existence on solvable Riemannian Lie groups, and discuss some ongoing work on compact conformal manifolds carrying two different Weyl–Einstein structures.

The talk is based on joint work with Viviana del Barco, Arthur Schichl and Mihaela Pilca.

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

On the analytical integrability of magnetic flows on compact manifolds

Gabriela Ovando
Universidad Nacional de Rosario, Argentina

Abstract. Magnetic flows are generalizations of geodesic flows. The aim of this talk is to show topological obstructions for analytical integrability in weakly exact magnetic fields. On the other hand, we show explicit examples for the construction of first integrals, making use of "magnetic Killing" tensors.

Joint works with M. Subils and A. Moroianu.

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

On the spectrum of 2-step nilmanifolds

Marcos do Nascimento Paes
Universidade Estadual de Campinas, Brazil

Abstract. In this short talk, we are going to see first some of the main results on the geometry of a 2-step Riemannian Lie group $(N, \langle\cdot,\cdot\rangle)$, a topic studied by Eberlein [1]. Next, we explore the geometry of nilmanifolds $\Gamma\backslash N$, which are compact Riemannian manifolds arising from $(N, \langle\cdot,\cdot\rangle)$.

It follows from the Kirillov theory that the dual of N, $\widehat{N}$ (the space of equivalence classes of unitary irreducible representations of N in Hilbert spaces), is in one-to-one correspondence with the quotient of the dual space of the Lie algebra, $\mathfrak{n}^*$, under the coadjoint action of N. In [2], Pesce describes which of these representations appear in the quasi-regular representation of N in $L^2(\Gamma\backslash N)$. Using this classification, C. Gordon establishes a sufficient condition for two 2-step Heisenberg-type nilmanifolds to be isospectral [3]. The topics presented in this talk are part of the author's ongoing Master's research project.[1]

References

[1] P. Eberlein, *Geometry of 2-step nilpotent groups with a left invariant metric*, Ann. Sci. École Norm. Sup. **27** (1994), 611–660.

[2] H. Pesce, *Calcul du spectre d'une nilvariété de rang deux et applications*, Trans. Amer. Math. Soc. **339** (1993), no. 1, 433–461.

[3] C. Gordon, *Isospectral closed Riemannian manifolds which are not locally isometric*, J. Differential Geom. **37** (1993), no. 3, 639–649.

[1] Supported by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP).

2 Days of Geometry in Córdoba
FAMAF, Universidad Nacional de Córdoba · October 29–30, 2026

Geometrically formal Hermitian manifolds

Tommaso Sferruzza
Universidade Estadual de Campinas, Brazil

Abstract. A Riemannian metric on a closed oriented smooth manifold is said to be geometrically formal if the product of harmonic forms is still harmonic. This phenomenon has two immediate consequences: the underlying manifold is rationally formal and the harmonic forms have constant pointwise norm. The latter is a weak holonomy reduction principle that can be used to obtain rigidity criteria. In this talk, I will present a series of recent results on complex manifolds admitting metrics which are geometrically formal in the Hermitian sense.