THE GEORGE WASHINGTON UNIVERSITY

WASHINGTON, DC

Colloquium: Distinguished Speculative First of April Talk

Title:	Topology with complicated points
Speaker:	Norbert A'Campo, Basel University, Switzerland
Date and Time:	Friday, April 6, 2018, 1:00–2:00pm
Location:	Rome Hall 204

Abstract: The Euler characteristic, as introduced by Leonard Euler, was the number of edges minus the number of points (vertices) plus the number of $\cdots$. The idea was perhaps first to count what you see and then what can define $\cdots$. So points were already complicated. Dimension 0 is more complicated than dimension 1, as is well manifested by the characters 零 and 一. In a good theory points are already complicated. In the first step this idea was manifested by introducing functors $\mathbb{F}^*$ with a complicated grounding $\mathbb{F}^0(\mathrm{pt})$. Alexandre Grothendieck went further: he postulated that there are many kinds of *points* and that each point has as main invariant its *fundamental group*. The idea is as follows. Think of a point p as defined by polynomial equations with coefficients in a field K. Consider, moreover, only regular equations with invertible Jacobian. Let $k \subset K$ be the subfield generated by $1 \in K$. Define the fundamental group $\pi_1(p)$ as the Galois group $\mathrm{Gal}(K/k)$.

This definition "fits" with a more classical definition for an important class of spaces. Here, "fits" means that this group appears in a short exact sequence together with more classically defined fundamental groups for those spaces.

An important point is the point $0 \in \overline{\mathbb{Q}}$ in the algebraic closure of the rationals. Its fundamental group is the compact group $\mathrm{Gal}(\overline{\mathbb{Q}}/\mathbb{Q})$. Amazingly, this group acts faithfully on the set E of isotopy classes of planar bicolored finite trees. An element $e \in E$ can be promoted in at least two different ways to classical links, most of which are hyperbolic.

The speaker speculates that in this zoo of hyperbolic three-manifolds, a counterexample to the strengthening of Mostow's Rigidity Theorem, as proposed by Ian Agol, can be found.

Short bio: Norbert A'Campo, born in 1941, is a Dutch mathematician. After his studies in Utrecht, Poitiers and Montpellier, he obtained his doctorate in 1972 from the University of Paris-Sud, with an important result stating that every simply connected manifold of dimension 5 carries a codimension-1 foliation. In his thesis, he also found an example of an isolated singularity with the homological monodromy of infinite order. At the Montreal International Congress of Mathematicians in 1974, he gave an invited talk on the monodromy group of isolated singularities of plane curves. He became a professor at the universities of Paris 7, Paris 11 and later Basel. In 1988, he was elected the President of the Swiss Mathematical Society. In 2012, he became a fellow of the American Mathematical Society. Besides foliation theory and singularity theory, Norbert A'Campo works in contact geometry, geometric group theory, knots and braids, hyperbolic geometry and Teichmüller theory. He is currently writing a monograph on Riemann surfaces.

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