Emergent Research:
The PIMS Postdoctoral Fellow Seminar

Nov 10, 2021 | 9:30am Pacific

Divided Power Algebras

ABSTRACT:

Divided power algebras were defined by H. Cartan in 1954 to study the homology of Eilenberg-MacLane spaces. They are commutative algebras endowed, for each integer n, with an additional monomial operation. Over a field of characteristic 0, this operation corresponds to taking each element to its n-th power divided by factorial n. This definition does not make sense if the base field is of prime characteristic, yet, Cartan's definition of divided power algebra applies in this situation as well. The notion of divided power algebra over a field of prime characteristics allows us to describe algebraic structures that appear in homology and homotopical algebra, and has found applications in a wide array or mathematical domains, for instance in crystalline cohomology, and deformation theory. In this talk we will review the motivations for the definition of divided power algebra. We will start by recalling some constructions of algebraic invariants from topological spaces, and we will show that divided power algebras arise naturally in this setting. We will give the generalised definition of a divided power algebra, given by B. Fresse in 2000, using the theory of operads. Finally, we will give a complete characterisation for generalised divided power algebras in terms of monomial operations and relations.

For more information and registration:
https://www.pims.math.ca/seminars/PIMSPDF

Sacha Ikonicoff
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SPEAKER BIO:

Sacha Ikonicoff was born and raised in the Paris region in France. He obtained his mathematics license degree in 2014, and his pure mathematics master's degree in 2016, both from Université Paris 6 - Pierre & Marie Curie (now "Sorbonne Université"). While studying for his master's degree, Sacha got more and more interested in the subject of algebraic topology. His master's thesis, written under the direction of Muriel Livernet, concerns the divided power algebra structures that appear on the homotopy of simplicial algebras. Muriel Livernet then became Sacha Ikonicoff's PhD advisor at Université de Paris. Throughout the course of his PhD, Sacha continued to work in the domain of algebraic operads and divided power algebras, and obtained a full characterisation of these structures in his article "Divided power algebras over an operad", published in the Glasgow Mathematical Journal in 2019. He also developed an operadic theory for unstable modules over the Steenrod algebra in the article "Unstable algebra over an operad", published in Homology, Homotopy and Applications in 2021.

Sacha obtained his PhD, entitled "Level algebras and applications to algebraic topology" in 2019. He is now a PIMSCNRS postdoctoral scholar at the University of Calgary in Alberta, Canada.

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