



DEPARTMENT OF
MATHEMATICS
Illinois State University

ISU Algebra Seminar

Time: Thursday, March 2, 2023. 12:00 pm – 12:50 pm.

Zoom Room ID: 942 3380 7001

Passcode: ISU

Zoom Room Link: <https://illinoisstate.zoom.us/j/94233807001>

Speaker: Vasily Sazonov, (CEA, Paris-Saclay University, France)

Title: Selective Gaussian Integration in pQFT Formulation of the Jacobian Conjecture

Abstract: In this talk, I will start by reviewing an approach to the Jacobian conjecture (JC) based on the tools from the perturbative quantum field theory (pQFT) developed in [A. Abdesselam, *Annales Henri Poincaré* 4 (2003) 199-215]. The results obtained in this paper allow one to represent the inverse map in JC as a formal integral, similar to ones appearing in the zero-dimensional field theory. The perturbative expansion of the latter integral leads to a sum of Feynman diagrams - trees, graphically encoding the series for the inverse map. These graphical and integral representations give a powerful tool for analyzing the combinatorics of JC. Then, I will present the selective Gaussian integration method (coloring of edges of the Feynman diagrams), developed for the needs of constructive field theory. Applying the selective Gaussian integration to the pQFT formulation of Jacobian conjecture, I will show the significant reduction in the number of trees in the series for the inverse map. I will conclude by describing the possibility to use this reduction in the number of trees to prove JC.

About the Speaker: Currently, Dr. Vasily Sazonov is a postdoc at the CEA, Paris-Saclay University, working on constructive and perturbative field theory, and quantum computations. Before, he was a postdoc at the University of Graz, and a Shroedinger fellow at the Laboratory of Theoretical Physics University Paris XI, at that time he was working on constructive and computational QFT. Dr. Vasily Sazonov obtained Ph.D. in theoretical high-energy physics at the University of Graz, and a Master's in statistical physics at St.Petersburg State University.