



A Non-Profit Association of a Learned Society

International Society of Nonlinear Mathematical Physics

isnmp.de

A Talk at the 2nd ISNMP Conference

Bad Ems, 28 June to 4 July 2026

Open Problems Session:

Speaker: Anton Dzhamay (BIMSA, China)

Title: *Discrete Painlevé Equations: what next?*

Abstract: The general theory of discrete Painlevé equations was laid out in the seminal paper of H. Sakai [Comm. Math. Physics, 2001]. This paper gives a full classification of possible configuration spaces, now called the Sakai surfaces (more accurately, surface families) of discrete Painlevé dynamics. The symmetry groups of these spaces are certain affine Weyl groups that also generate the discrete Painlevé dynamics, which corresponds to translation or quasi-translation elements in these groups. This theory by now is well-established. The question I want to address is how can it be extended and generalized.

There are two directions one can look at this: specification and generalization. The first includes discrete Painlevé equations with constraints, their symmetry groups, classification and significance for the applications. The second asks for the meaningful generalization of the Sakai geometric approach for higher order or, equivalently, higher-dimensional systems.