

A proof of the J -generalization of the Göllnitz-Gordon-Andrews identities via commutative algebra

Gurinder SINGH

Abstract. The Göllnitz-Gordon-Andrews identities are partition identities given by Andrews [2], which are a generalization of the partition identities discovered independently by H. Göllnitz [3] and B. Gordon [4], called the Göllnitz-Gordon identities.

Aim of this talk is to present a commutative algebra proof of the Göllnitz-Gordon-Andrews identities. In fact, we give a proof of more general identities, which we call the J -generalization of the Göllnitz-Gordon-Andrews identities. In the proof, we relate the generating function of the partition function in these identities with a Hilbert-Poincaré series of a suitably constructed graded algebra.

The talk is based on joint work with R. Barman and A. Ghosh, motivated by the work of Afsharijoo [1] on Gordon's identities.

About the speaker. Gurinder Singh is a postdoctoral fellow at the School of Mathematical Sciences of Hebei Normal University, where he has been since March 2026. He completed his PhD at the Indian Institute of Technology Guwahati (Assam, India). He works in number theory and combinatorics, with a particular focus on the theory of integer partitions. He investigates various aspects of combinatorics and modular forms in the study of partition functions. He studies the arithmetic properties of partition functions, including their distribution modulo certain prime powers and their asymptotic behavior. His research interests also lie in the field of partition identities and partition inequalities.

REFERENCES

- [1] P. Afsharijoo, *Looking for a new version of Gordon's identities*, Ann Comb. 25 (2021), 543–571.
- [2] G. E. Andrews, *A generalization of the Göllnitz-Gordon partition theorems*, Proc. Amer. Math. Soc. 18 (1967), 945–952.
- [3] H. Göllnitz, *Partitionen mit Differenzenbedingungen*, J. Reine Angew. Math. 225 (1967), 154–190.
- [4] B. Gordon, *Some continued fractions of the Rogers-Ramanujan type*, Duke Math. J. 31 (1965), 741–748.

SCHOOL OF MATHEMATICAL SCIENCES, HEBEI NORMAL UNIVERSITY | 050024 SHIJIAZHUANG, CHINA

E-mail: gurindermaan1018@gmail.com · *Web:* <https://sites.google.com/view/gurindersingh>