

PARTITION IDENTITIES INSPIRED BY RAMANUJAN

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Our study has its origin in the work of H. M. Farkas and I. Kra, who observed that certain theta function identities can be transformed into remarkable identities for partition functions. The present author then observed that many of these theta function identities can be recast in the language of Ramanujan's modular equations. The author and his co-author, Roberta Rui Zhou, continue this study. First, we examine Ramanujan's formulas for multipliers from his second notebook, and find that each implies a beautiful partition identity. Second, inspired by the work of Ole Warnaar and Sun Kim on bijective proofs of partition identities arising from modular equations, in a recent systematic study, Colin Sandon and Fabrizio Zanello offered 30 conjectured partition identities. The author and Zhou have now proved all of these identities, but we emphasize that bijective proofs have yet to be found. We discuss these two facets of our work on partitions in this lecture.