

1086-11-1302

**Song Heng Chan** ([chansh@ntu.edu.sg](mailto:chansh@ntu.edu.sg)), School of Physical & Mathematical Sciences, Nanyang Technological University, 21 Nanyang, link, Singapore, 637371, Singapore, 637371, Singapore, **Atul Abhay Dixit\*** ([adixit@tulane.edu](mailto:adixit@tulane.edu)), Department of Mathematics, Tulane University, 6823 Saint Charles Avenue, New Orleans, LA 70118, and **Frank G. Garvan** ([fgarvan@ufl.edu](mailto:fgarvan@ufl.edu)), Department of Mathematics, University of, Florida, Gainesville, Gainesville, FL 32611.  
*Rank-Crank-type PDEs and generalized Lambert series identities.*

We show how Rank-Crank type PDEs for higher order Appell functions due to Zwegers may be obtained from a generalized Lambert series identity due to Chan. Special cases are the Rank-Crank PDE due to Atkin and Garvan and a PDE for a level 5 Appell function found by Garvan. These two special PDEs are related to generalized Lambert series identities due to Watson and Jackson respectively. Chan's Lambert series identity is a common generalization. We also show how Atkin and Swinnerton-Dyer's proof using elliptic functions can be extended to prove this generalized Lambert series identity. This is joint work with Song Heng Chan and Frank G. Garvan. (Received September 20, 2012)