1077-60-1255 **Dan Dumitru Betea*** (dan.betea@caltech.edu), 1200 E California Blvd, Caltech Math 253-37, Pasadena, CA 91125. *Elliptic distributions on 3D Young diagrams, elliptic special functions and elliptic Painleve.* Preliminary report.

We describe bridges between combinatorial (dimer) models and elliptic special functions, focusing on algebraic aspects. We look at elliptically distributed lozenge tilings of a hexagon and nonagon. In the hexagon case, the partition function can be computed leading to elliptic Macmahon identity; in the nonagon case it leads to the elliptic Painleve equation. With hexagonal boundary conditions, the N-point function in the particle interpretation generalizes the GUE distribution in random matrix theory and is related to Rains' multivariate elliptic biorthogonal functions. The process associated to the hexagon can be interpreted in terms of the elliptic difference operators introduced by Rains. In this respect we obtain new processes useful for an exact sampling algorithm from the distribution. The processes are determinantal with Christopher-Darboux-like correlation kernels in terms of elliptic biorthogonal functions that generalize the (Askey and) q-Askey scheme of orthogonal polynomials. With nonagonal boundary conditions, the partition function is a tau function for the elliptic Painleve equation, which follows from certain E_8 symmetries satisfied by the order I elliptic beta integral. Combinatorial interpretations of such symmetries may be given, time permitting. (Received September 18, 2011)