The two main themes of the program are KPZ equations and random matrices. In both topics there have been several major breakthroughs that were at least partially inspired by this program. In the following, we list some of these results.

For the KPZ equation, the first major result was the well-poseness of the KPZ equation pioneered by M. Hairer. In this theory, Hairer settled not just the well-poseness of the KPZ equation, but extended it to many nonlinear stochastic partial differential equations, including the stochastic quantization equations. In a different direction, H. Spohn observed that the multi-component version of the KPZ equation describes the equilibrium time correlations of one-dimensional classical fluids on large space time-scales. This theory has since been extensively tested through molecular dynamics simulations and applied to many physical systems. Another major KPZ related breakthrough was the work by D. Remenik and J. Quastel, who were inspired by some questions and discussions with J. Frohlich to initiate a program which led directly to the discovery of the fixed point of the KPZ universality class.

For works concerning the random matrix theme, the Wigner-Dyson-Metha universality conjecture in the sense of the convergence of correlation function at a fixed energy was finally settled in a project initiated during this special year. This work has largely settled the Wigner-Dyson-Metha conjecture for matrix ensembles. The matrix ensembles, however, are mean-field models, while physical systems are governed by local interactions which are non mean-fielded. A central question in random matrix theory is why the mean-field matrix ensembles can be used to predict non mean-field physical systems. A toy model, which is still very difficult to analyze, for non mean-field systems, is the band matrix ensemble. Initiated in some discussions in this special year, a mean-field reduction idea was introduced to identify the eigenvalue statistics for the random band matrices for the first time. A central concept used in the mean-field reduction, probabilistic quantum unique ergodicity, is closely related to the quantum unique ergodicity introduced by Rudnick and Sarnak in the geometric context. The main researchers involves in these works include, among others, P. Bourgade, L. Erdos, H.T. Yau, and J. Yin.