Summary of Discussion Session #3 (November 7, 2012)

"Multiple-field(*) Inflation"

(*) Definition of "multiple-field inflation" here is the inflation models in which there are multiple fields whose masses are smaller than or comparable to the Hubble rate during inflation.

Question: What are the promising (general) ways to produce f_{NL}=O(10)?

Answer: There are two classes of models:

1. Turning of the trajectories in field space. There are three sub-classes:
   1a. "Ridge" - diverging field trajectories. For the canonical kinetic term, they produce a negative f_{NL}
   1b. "Focus" - converging field trajectories. For the canonical kinetic term, they produce a positive f_{NL}
   1c. "Quasi Single-field" - turning couples inflaton and "isocurvatons" (fields whose masses are comparable to the Hubble rate during inflation)

2. Modulation of the end-of-inflation (or reheating) surface. This includes curvaton; modulated reheating; modulated trapping; preheating; multi-brid; etc

Question: How can we test multi-field models?

Answer: Observational signatures include:

- Slope of the halo bias [see summary of the "large-scale structure" session for more complete description]
- f_{NL}–g_{NL} relation; and Suyama-Yamaguchi (in)equality $\tau_{NL} \geq (6f_{NL}/5)^2$
  - Strictly speaking, the SY relation should always be an inequality due to loop corrections
- Scale-dependence of f_{NL}, g_{NL}, τ_{NL} etc
- Isocurvature (entropy) perturbations
- Subtle shape dependence of the bispectrum
  - E.g., $f_{NL}(\mathbf{k}_{long}$\cdot $\mathbf{k}_{short})$ from higher-spin fields
- Tensor-to-scalar ratio
  - E.g., detection of the tensor-to-scalar ratio at the level of O(0.01) puts the curvaton scenario in the inflation-dominated regime
- Spectral tilt
  - E.g., $1-n_s$=O(0.01) implies "large-field" ε=O(0.01) or "hilltop" η=O(0.01)
- A definitive way to rule out the single-field inflation with the canonical kinetic term is to show the violation of $r=-8n_{tensor}$