



Degrees of freedom of the K-user interference channel with transmitter cooperation

V. Sreerkanth Annapureddy, Aly El Gamal, and Venugopal V. Veeravalli

- K-user fully connected Gaussian interference channel

- **Cooperation:** each message can be available at **M** transmitters

- **Criterion:** pre-log factor of sum rate at high SNR

Our Questions

- Is Partial Cooperation ($M < K$) useful?
- If yes, does the gain scale with K (fixed M) ?
- Distribution of messages over transmitters!

What We Know!

- Partial Cooperation can increase sum degrees of freedom beyond $K/2$
 - Not through clustering!
 - Asymptotic interference alignment (**$K=4$, $M=2$, $2/3$ d.o.f. per user**)
- For large K , Cooperation **does not** increase sum d.o.f. for $M=2$
 - Also for all values of M and some distributions of messages of practical significance
- Insights on selecting the optimal message distribution