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## Capacity and Error Exponents for Multiple Access Channels in the Poltyrev Regime

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Shannon theory uses an asymptotic model to study fundamental limits on the capacity of communication channels to carry information. The Shannon capacity of a point to point channel is the highest rate (in bits per degree of freedom) at which it is possible to communicate over the channel when allowing for coding over arbitrarily large block lengths. For communication problems with multiple sources and destinations, one seeks a Shannon capacity region.

Going beyond capacity, one can seek the error exponent of a point to point channel, giving the rate of decay of error probability with block length at rates below the Shannon capacity. It is notoriously difficult to determine this, and the error exponent is not known to date even for the most basic point to point channels such as the additive white Gaussian noise channel. For communication problems with multiple sources and destinations, one seeks the error exponent region.

In this talk we study the error exponent of dimension-matched additive-noise multiple access channels in the Poltyrev regime. A multiple access channel models a scenario where multiple transmitters wish to simultaneously communicate to a single receiver, such as in the uplink of a wireless system. The Shannon capacity region of multiple access channels is well understood, but little is known about the error exponent region. We focus on the Poltyrev regime, which is the regime of high signal-to-noise ratio and develop lower bounds for the error exponent region using ideas from point process theory and large deviations theory.

The necessary background from information theory, point process theory, and large deviations theory will be provided during the talk.

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