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# Asymptotic Analysis of SU-MIMO Channels with Transmitter Noise and Mismatched Joint Decoding

- Hardware impairments: binoisy model

$$y = H(x+v) + \text{noise}$$

- Impact on achievable rate derived
  - Used the **replica method** to evaluate mutual information
    - See Appendix B in the paper (nice summary of the method itself)
- Impact of mismatched detection/decoding
  - Receiver ignores the HW impairments
- **Conclusions:**
  - Impact of HW impairments significant only at high modulation orders
  - Mismatched decoding: minor compared to HW impairments

# Quick, Decentralized, Energy-Efficient One-Shot Max Function Computation Using Timer-Based Selection

- Determine max. of sensor readings
  - Sensors are clustered
  - Computation over two timer + contention-based stages:
    - Nodes to cluster-heads
    - Cluster-heads to fusion nodes
- Optimization: min. avg. time to find max.
  - Subject to a failure probability constraint
- Analysis: scalable (to number of nodes) and robust (to knowledge of the number of nodes) algorithm
  - Asymptotic analysis of the expected selection time

# Mutual Information Analysis on Spatial Modulation Multiple Antenna System

- Computation of the theoretical TPM and MI of the ML antenna detector, with Gaussian input symbols
- SM-MISO: error probability and MI in closed-form
  - Complex Gaussian signaling:  $\Pr(\text{antenna decoding error})$  does not  $\rightarrow 0$  as  $\text{SNR} \rightarrow \text{infinity}$ . So, poor perf. at (very) high SNRs
  - Real Gaussian signaling: overcomes the above drawback, but poor performance at low SNR
  - Constant modulus signaling: meets perf. of V-BLAST at low SNR
- Multiple rx antenna SM: union bound of error probability and lower bound on MI
- Compared with V-BLAST: V-Blast outperforms SM, but not by much w/complex Gaussian input signaling

# Outage Minimization via Power Adaptation and Allocation in Truncated Hybrid ARQ

- HARQ with repetition and incremental redundancy, and
  - Conventional 1 bit ACK/NACK feedback
  - Multi-bit feedback of state of receiver
- Goal: minimize long-term outage probability
  - Constraints: peak and average power
- Approach: dynamic programming
  - Approximate closed-form solution in high SNR obtained using geometric programming
- Results:
  - Advantage of multi-bit quantization over one-bit fb
  - Power optimization leads to significant gains

# Others

- Cooperative multi-cell MIMO downlink precoding with finite-alphabet inputs
- Mobile communication systems in the presence of fading/shadowing, noise, and interference
- Energy detection technique for adaptive spectrum sensing
- Improper signaling for symbol error rate minimization in K-user interference channel