Partitioned Guessing Random Additive Noise Decoding

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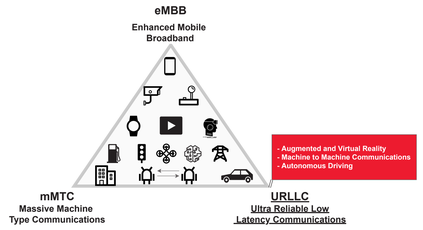
ISIP Integrated Systems for Information Processing

UNIVERSAL DECODERS FOR SHORT CODES

- **Short codes** are needed for **URLLC** applications
- GRAND is a **Universal Decoder** for short-length and high-rate codes

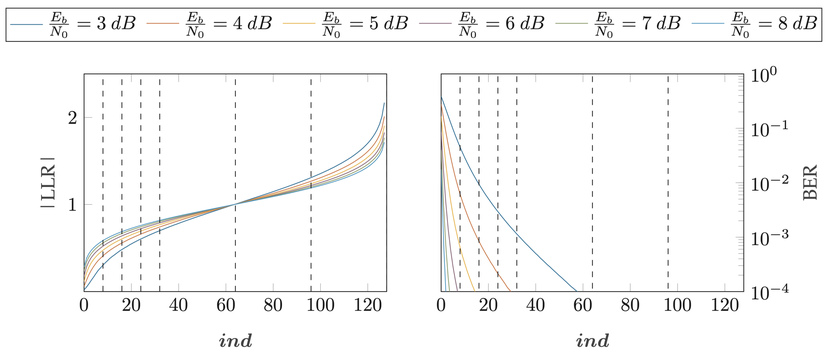


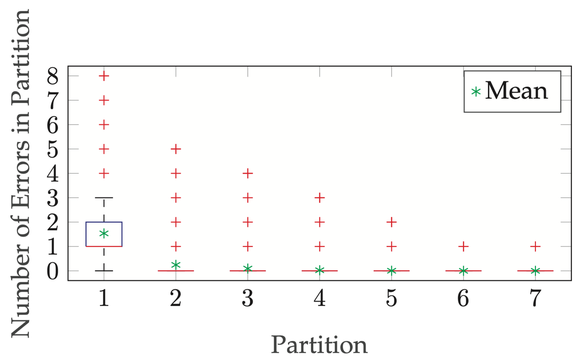
GRAND VARIANTS

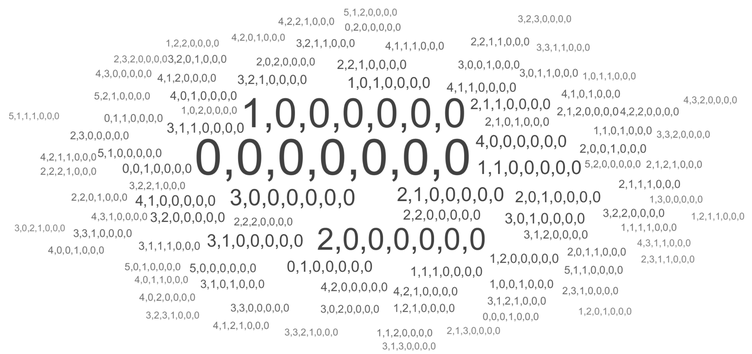
GRAND variants differ by the order of test error patterns (TEPs) applied:

- **ORBGRAND**[1]: Applies TEPs in Logistic Weight (LW) order
- **SGRAND** [2]: Applies TEPs in Maximum Likelihood (ML) order

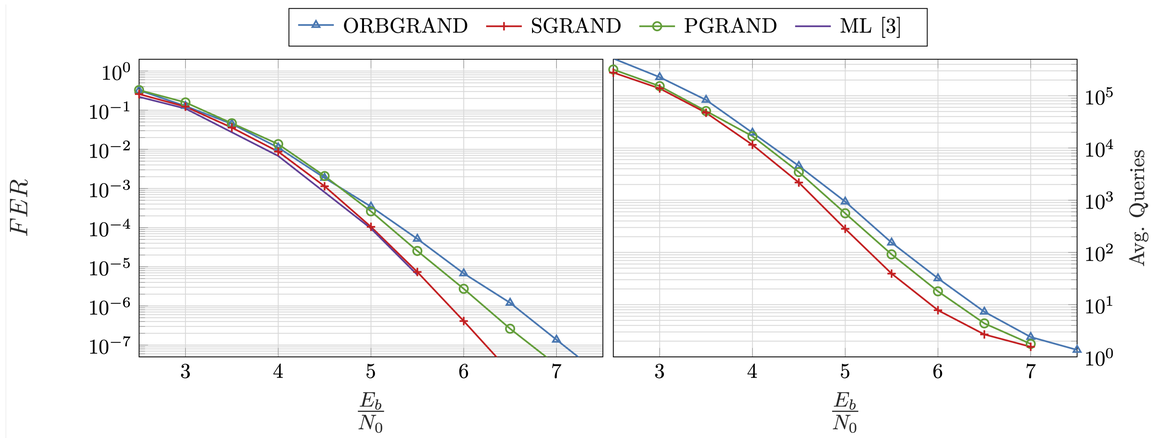
PROPOSED PGRAND



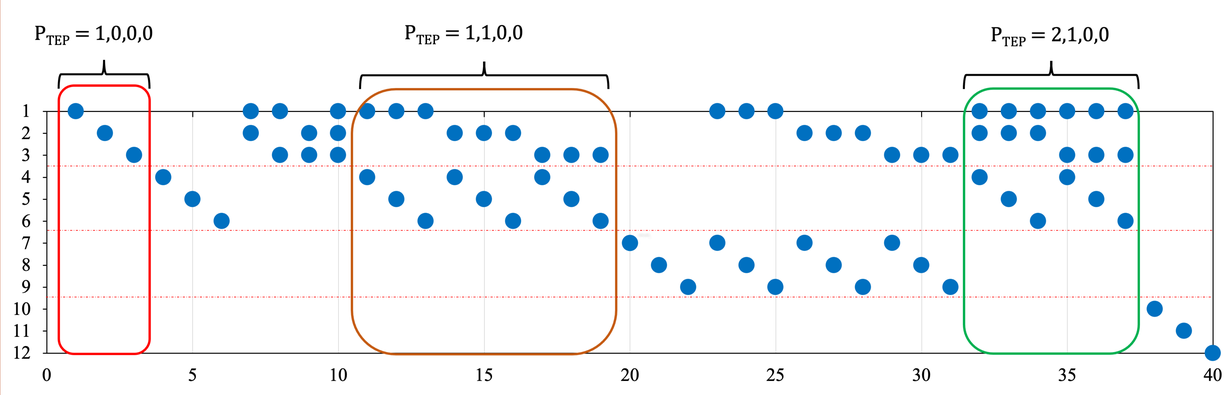




PERFORMANCE EVALUATION FOR BCH (127,106)



TEST ERROR PATTERNS GENERATION FOR PGRAND



FOR DECODING BCH (127,106):

0.2 ∼ 0.3 dB gain compared to ORBGRAND (target FER 10^{-7})

50% reduction of average computation complexity compared to ORBGRAND

REFERENCES

[1] Duffy et al. "Ordered reliability bits guessing random additive noise decoding," IEEE ICASSP, 2021.
[2] Solomon et al. "Soft maximum likelihood decoding using GRAND," IEEE ICC, 2020.
[3] Michael Helmling et al. Database of Channel Codes and ML Simulation Results. www.uni-kl.de/channel-codes, 2019.