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*Capacity achieving low-density parity-check lattices*

In 2000, Forney (IEEE Trans. Inform. Theory **46**, 830–850) defined the concept of capacity achieving of lattices on AWGN channels. By introducing coset-codes, he proved the existence of such lattices and called them “sphere bound achieving”.

Low-density parity-check (LDPC) codes (Gallager, 1963) have a very good performance under iterative decoding algorithm. In 2006, Sadeghi et. al. (IEEE Trans. Inform. Theory **52**, 4481–4495) introduced LDPC Lattices. Construction  $D'$  (Bos and Convey, Mathematika **29**(1982), 171–180) converts a set of parity checks defined by a family of nested code into congruences for a lattice. This type of construction is applied to LDPC codes to generate LDPC lattices.

In this talk we show that this type of lattices are capable of sphere bound achieving, that is, for AWGN channel with noise variance per dimension  $\sigma^2$ , there exists a lattice with volume  $V$  of large enough dimension  $n$  such that the error probability is small whenever  $\sigma^2 < \frac{V^{\frac{2}{n}}}{2\pi e}$ .