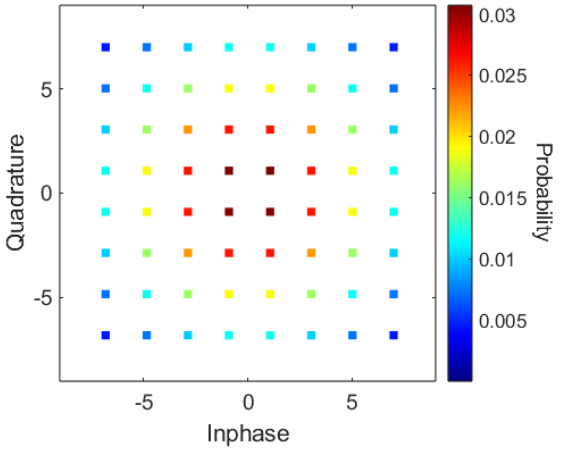
Master Thesis:

Probabilistic Constellation Shaping for Ultrabroadband Data Communications

Probabilistic Constellation Shaping (PCS) is a powerful technique in data communications to enhance spectral efficiency and energy savings by optimizing the probability distribution of transmitted symbols. The widely used M-ary QAM formats with uniformly distributed symbols only reach the Shannon capacity under certain channel conditions. PCS allows to dynamically adapt the entropy of the transmitted symbols by using a Maxwell-Boltzmann distribution to approach the Shannon capacity.

Your tasks:

- Conducting a literature review about state-of-the-art PCS schemes
- Implement a modulator & demodulator for shaped constellations using MATLAB or Python
- Verifying the functionality in a transmission experiment in the lab



64-QAM constellation shaped with a Maxwell-Boltzmann distribution

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