

Third-Order Asymptotics in Channel Coding: Old and New

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Abstract: In this talk, we first revisit some of my joint work from 2012-3 with M. Tomamichel, which established the third-order term in the asymptotic expansion for the maximum number of bits transmissible over a large class of discrete memoryless channels (DMCs). In this old work, we definitively establish for non-singular channels that the third-order term is $+1/2 \log n + O(1)$ where n is the number of channel uses. Since 2012-3, a large number of works in higher-order asymptotics have been devoted to discrete-time channels and sources, often in multi-terminal settings. In the second part of my talk, I will describe some recent joint work with Y. Sakai and M. Kovačević, in which we establish bounds on the third-order term of the continuous-time Poisson channel, the first instance of higher-order asymptotics being established for continuous-time channels. In contrast to the DMC work in which we choose the output distribution in the meta-converse (cf. Polyanskiy, Poor, Verdú) to be an exponentially-weighted discretization of the output simplex, for the Poisson case, an exponentially-weighted discretization of the input simplex is employed.