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STATISTICS COLLOQUIUM

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TALK: 4:15 PM — SCIENCE CENTER RM. 705

RECEPTION: 3:50 PM — SCIENCE CENTER, 7TH FLOOR

“The confident Bayesian? On the frequentist validity of Bayesian nonparametric inference”

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ABSTRACT

In the last decade much effort has gone into the development of Bayesian inference tools for nonparametric function estimation problems, and most recently also for the ubiquitous ‘high-dimensional’ inference problems. This concerns both methodology to compute posterior distributions, but also a theory that demonstrates that certain priors generate posterior distributions which ‘adaptively pick up the right features of the true parameter’ when analysed under the frequentist sampling assumption. Most such results establish ‘contraction rates’ for the posterior about the true parameter, but say little about what is perhaps most important in the frequentist analysis of Bayesian procedures, namely whether posterior-based statistical decisions actually have frequentist validity, or, more concretely: whether Bayesian credible sets are actual frequentist confidence sets? The reason is that answering such a question is fundamentally more difficult, as already highlighted in work by Diaconis and Freedman in the late 90s which establishes the impossibility of a Bernstein-von Mises theorem in certain ‘canonical’ nonparametric models. In this talk we shall revisit these negative results and then explain recent advances on the problem that show that whether a high-dimensional/nonparametric Bayesian credible set is a frequentist confidence set or not depends on several things, among them the geometry of the set as well as certain features of the high-dimensional signal that generates the observations. [This is joint work with I. Castillo, Paris].