## Approximate Bayesian Inference for Latent Gaussian Models

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In this talk, I will review some results for doing approximate Bayesian inference for the class of latent Gaussian models. This class includes, among others, (generalised) linear models, (generalised) additive models, smoothing-spline models, state-space models, semiparametric regression, spatial and spatio-temporal models, log-Gaussian Cox-processes, and geostatistical models. Although inference is usually done using iterative sampling based methods (MCMC), we show that we can provide both more accurate and more computational efficient approximations of the (univariate) posterior marginals; both for the latent field and the hyperparameters. In fact, our estimates can be considered as "practically exact" as we do not find any errors in them using very long MCMC runs. The typical computing time is in terms of seconds compared to many minutes or hours for a comparable MCMC scheme. Important summaries, like the deviance information criteria, the marginal likelihood, Bayesian "cross-validation" measures, can also be computed. The computing machinery in our approach take advantage of the precision matrix structure in the latent field by using appropriate numerical schemes, and also scales nicely a multicore computational environment.

This is joint work with Sara Martino and Nicolas Chopin.