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## Efficient Monte Carlo Uncertainty Quantification Through Problem-dependent Proposals

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### Summary

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The solution of an inverse problem is a process where an algorithm asks questions to the data. In some cases the questions are yes/no questions (accepting or rejecting a model proposed by a Markov Chain Monte Carlo (MCMC) algorithm) and in other cases the questions are more complex, as in a deterministic algorithm's quest for gradients or curvatures. However, no algorithm can ask the right question without an efficient interrogation strategy. Such a strategy comes from what we call 'prior information', either about the solution to be found, or about the nature of the forward relation. The latter strategy is particularly important and is for MCMC algorithms expressed through the 'proposal distribution'. We shall explore the importance of proposal strategies, and show that dramatic improvements can be made if information-rich strategies are employed.