# Limit theorems via martingale approximation

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The talk will survey the role of martingale approximation in studying the asymptotic behavior of stochastic processes. The method goes back to Gordin and the theory was developed by many mathematicians including Philipp, Kipnis, Varadhan, Hall, Heyde, Maxwell, Woodroofe, Zhao, Wu, Volny, Dedecker, Merlevède among others. We shall stress the characterization of stochastic processes that can be approximated by martingales for deriving the conditional functional central limit theorem. The results are easily applicable to a variety of examples, leading to a better understanding of the structure of several classes of stochastic processes and their asymptotic behavior. The approximation brings together many disparate examples in probability theory. It is valid for classes of variables defined by familiar projection conditions, various classes of mixing processes including the large class of strong mixing processes and to classes of reversible and normal Markov operators. Joint work with Mikhail Gordin.