

# Deriving the Loop Series

## **Two Existing Approaches** *(Chertkov & Chernyak 2006)*

- Saddle point approximation of BP fixed point based upon contour integration in a complex auxiliary field
- Employ Fourier representation of binary functions, and manipulate terms via hyperbolic trigonometric identities

## **Our Contribution: A Probabilistic Derivation**

- Simple, direct derivation from reparameterization characterization of loopy BP fixed points
- Exposes probabilistic interpretations for loop series terms, and makes connections to other known invariants