# Yang Baxter Field and Stochastic Vertex Models

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based on a collaboration with A. BUFETOV and L. PETROV

Stochastic Analysis, Random Fields and Integrable Probability

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Tokyo Tech

# Yang Baxter Field and Stochastic Vertex Models

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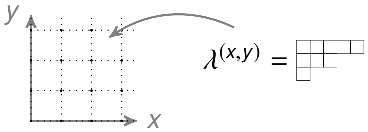

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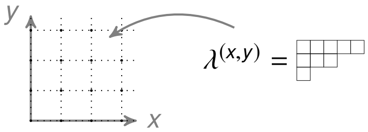


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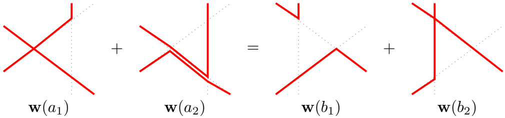

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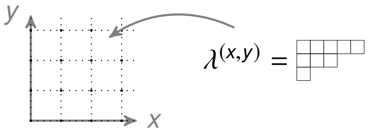


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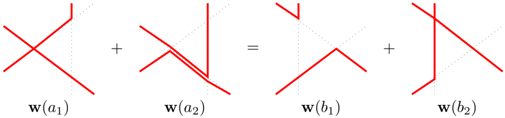


- A bijectivization [Bufetov-Petrov '17] is a way to assign transition probabilities

$$\mathbb{P}(a_i \to b_j).$$

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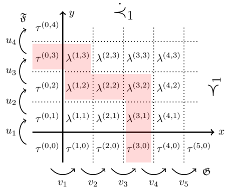
- Random fields of Young diagrams are popular objects in Integrable Probability because they allow the description of random tilings, stochastic interacting particle systems, stochastic vertex models, etc.
- In our case, the random field inherits its integrability from the Yang-Baxter Equation. The joint probability distribution along down-right paths $\pi$ assume the form




$$\mathbb{P}(\{\lambda^{(x,y)}\}_{(x,y)\in\pi}) = \frac{1}{Z_\pi} \prod_{i:\ y_{i+1}=y_i-1} \mathfrak{F}_{\lambda^{(x_i,y_i)}/\lambda^{(x_{i+1},y_{i+1})}}(u_{y_i})$$

$$\times \prod_{i:\ x_{i+1}=x_i+1} \mathfrak{G}_{\lambda^{(x_{i+1},y_{i+1})}/\lambda^{(x_i,y_i)}}(v_{x_{i+1}})$$

where $\mathfrak{F}, \mathfrak{G}$ are special symmetric functions (multi-parameter generalizations of the Schur polynomials).

# Yang Baxter Field and Stochastic Vertex Models

Results we obtain considering this simple procedure:

- From marginal observables (e.g. $\lambda^{(x,y)} \to \text{length}(\lambda^{(x,y)})$) we recover the Stochastic Six Vertex Model [Gwa-Spohn '92], the Stochastic Higher Spin Six Vertex Model [Corwin-Petrov '15] and also more general vertex models

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- We are able to construct "MacDonald operators"for symmetric functions $\mathfrak{F}, \mathfrak{G}$. These are guessed from known results about stochastic vertex models
- We describe statistics of the random field using these new operators (like in MacDonald Processes [Borodin-Corwin '11])