5-minute Talk

Petr Pushkar

Graduate Student at Columbia University
Advisor: Andrei Okounkov
Program Associate at Enumerative Geometry beyond Numbers
Interests: Enumerative Geometry and Representation Theory

Research (joint with P.Koroteev, A.Smirnov, A.Zeitlin)

My research focuses on connections between Enumerative Geometry and Representation Theory and Quantum Integrable Systems in the example of Nakajima Quiver Varieties.

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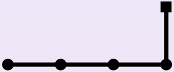

$\longrightarrow$ Cotangent bundles to partial flags

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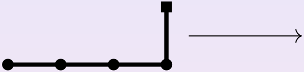

Cotangent bundles
to partial flags

Most basic, but interesting example: $T^*Gr(k,n) = X$

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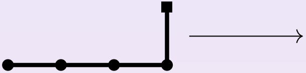

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$K_T(X)$

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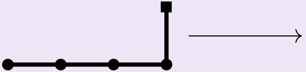

Cotangent bundles to partial flags

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$K_T(X)(a_1,...,a_n,\hbar)$

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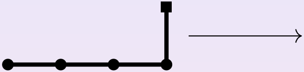

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$$\begin{array}{c} K_T(X)(a_1,...,a_n,\hbar) \\ \bigcup \\ \mathcal{V}, \wedge^i \mathcal{V} \end{array}$$

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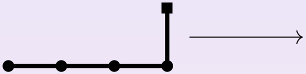

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$$\begin{tikzcd} K_T(X)(a_1, ..., a_n, \hbar) \\ \mathcal{V}, \wedge^i \mathcal{V} \arrow[u, phantom, "\bigcup"] \arrow[d, "\text{eigenval}"] \\ Sym(a_i) \end{tikzcd}$$

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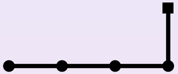

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$$\begin{tikzcd}
K_T(X)(a_1, \dots, a_n, \hbar) \arrow[r, dashed, "\text{quasimaps}", "\text{deform } \otimes"'] & QK(X)(z) \\
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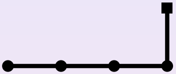

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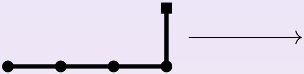

Cotangent bundles
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Most basic, but interesting example: $T^*Gr(k,n) = X$

Bethe roots allow us to express things in terms of representation theory of $\mathcal{U}_\hbar(\widehat{\mathfrak{sl}}_2)$ and quantum integrable systems.

$$\begin{tikzcd}
K_T(X)(a_1, \dots, a_n, \hbar) \arrow[r, dashed, "\text{quasimaps}", "\text{deform } \otimes"'] & QK(X)(z) \arrow[ddd, "\mathcal{V}, \wedge^i \mathcal{V}"] \\
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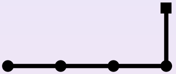

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$$\sum_{i=0}^{n} K_T(T^*Gr(k,n)) = \prod_{i=1}^{n} \mathbb{C}^2(a_i)$$

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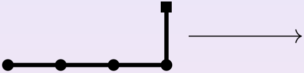

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Current and Future : see how this interacts with symplectic duality. Example: $Hilb_n(\mathbb{C}^2)$, self-dual.