April 18: Roman Travkin (Clay Institute), "Quantum geometric Langlands correspondence in positive characteristic: the GL(N) case."

Let C be a smooth connected projective curve of genus > 1 over an algebraically closed field k of characteristic $p > 0$, and $c \in k \setminus \mathbb{F}_p$. Let Bun_N be the stack of rank N vector bundles on C and $\mathcal{L}_{\mathrm{det}}$ the line bundle on Bun_N given by determinant of derived global sections. We construct an equivalence of derived categories of modules for certain localizations of twisted crystalline differential operator algebras $\mathcal{D}_{\mathrm{Bun}_N, \mathcal{L}_{\mathrm{det}}^c}$ and $\mathcal{D}_{\mathrm{Bun}_N, \mathcal{L}_{\mathrm{det}}^{-1/c}}$.

The first step of the argument is the same as that of `arxiv:math/0602255` for the non-quantum case: based on the Azumaya property of crystalline differential operators, the equivalence is constructed as a twisted version of Fourier–Mukai transform on the Hitchin fibration. However, there are some new ingredients. Along the way we introduce a generalization of p-curvature for line bundles with non-flat connections, and construct a Liouville vector field on the space of de Rham local systems on C.