Consider a toric Calabi-Yau orbifold $X$ with semi-projective moduli space, and let $Y \to X$ be a crepant resolution of its coarse moduli space. Choose a Lagrangian boundary (Aganagic-Vafa brane) condition $L$ on $X$ and denote by $L'$ its transform in $Y$. Fix a $\mathbb{C}^*$-action with zero-dimensional fixed loci such that the resolution morphism is equivariant. Denote the equivariant parameter by $\nu$. For $Z = X$ or $Y$, let $H(Z)$ be the equivariant Chen-Ruan cohomology ring of $Z$, $H_Z = H(Z)(\langle z^{-1} \rangle)$ be its Givental’s symplectic vector space of $Z$, and $\Delta_Z$ be the free module over $\mathbb{C}[\nu]$ spanned by equivariant lifts of orbifold cohomology classes with degree less than or equal to 2.

The paper under review defines a family of elements of Givental space $\mathbb{P}^\text{disk}_{L,X}: H(X) \to H_X$ called the winding neutral disk potential. It encodes disk invariants of $(X, L)$ at any winding $d$. $\mathbb{P}^\text{disk}_{L',Y}$ is defined similarly. The paper then proposes the following version of open crepant resolution conjecture (OCRC):

There exists a $\mathbb{C}((z^{-1}))$-linear map of Givental spaces $\mathcal{O}: H_X \to H_Y$ and analytic functions $\mathcal{H}_X: \Delta_X \to \mathbb{C}$, $\mathcal{H}_Y: \Delta_Y \to \mathbb{C}$ such that $\mathcal{H}_Y^{1/2} \mathbb{P}^\text{disk}_{L',Y}|_{\Delta_Y} = \mathcal{H}_X^{1/2} \mathcal{O} \mathbb{P}^\text{disk}_{L,X}|_{\Delta_X}$ after analytic continuation of quantum cohomology parameters. Moreover, both $\mathcal{O}$ and $\mathcal{H}$ are completely determined by the classical toric geometry of $X$ and $Y$. Furthermore, when $X$ is a Hard Lefschetz Calabi-Yau orbifold, the OCRC comparison extends to all of $H(Z)$ and hence also allows proposing a comparison for potentials encoding higher genus invariants with arbitrary boundary conditions.

The main result of the paper under review proves OCRC conjecture above for the $A_n$ orbifold $X = [\mathbb{C}^2/\mathbb{Z}_{n+1}] \times \mathbb{C}$ any choice of Aganagic-Vafa brane.

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MSC:
14N35 Gromov-Witten invariants, quantum cohomology, Gopakumar-Vafa invariants, Donaldson-Thomas invariants (algebro-geometric aspects)
53D45 Gromov-Witten invariants, quantum cohomology, Frobenius manifolds

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J. Bryan and A. Gholampour, Root systems and the quantum cohomology of ADE resolutions, Algebra Number Theory 2 (2008), no. 4, 369-399. - Zbl 1159.14028


W. Donovan and E. Segal, Mixed braid group actions from deformations of surface singularities, preprint (2013), .


H. Eynon, Multiple hypergeometric functions and applications, Ellis Horwood, Chichester 1976. - Zbl 0337.33001


A. Givental, A mirror theorem for toric complete intersections, Progr. Math. 160 (1998), 141-175. · Zbl 0936.14031
M. Herbst, K. Hori and D. Page, Phases of \((N=2)\) theories in 1\(\text{+}1\) dimensions with boundary, preprint (2008).
M. Kapovich and J. J. Millson, Quantization of bending deformations of polygons in \(\text{\texttt{mathbb\{}E\texttt{\}}}^3\), hypergeometric integrals and the Gassner representation, Canad. Math. Bull. 44 (2001), no. 1, 36-60. · Zbl 1008.53073
H. Ke and J. Zhou, Quantum McKay correspondence via gauged linear sigma model, in preparation.
G. Lauricella, Sulle funzioni ipergeometriche a piu variabili, Rend. Circ. Mat. Palermo 7 (1893), 111-158. · Zbl 25.0756.01
M. Mariño and C. Vafa, Framed knots at large \(\text{\texttt{\it text{}N{}\}}}\), Orbifolds in mathematics and physics (Madison 2001), Contemp. Math. 310, American Mathematical Society, Providence (2002), 185-204. · Zbl 1042.81071
S. Romano, Special Frobenius structures on Hurwitz spaces and applications, Ph.D. thesis in Mathematical Physics, SISSA, Trieste 2012.
J. Solomon, Intersection theory on the moduli space of holomorphic curves with Lagrangian boundary conditions, preprint.


[76] L. Toscano, Sui polinomi ipergeometrici a più variabili del tipo F_ D di Lauricella, Matematiche (Catania) 27 (1973), 219-250. · Zbl 0281.33009


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