Poster Pitch for #52

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September 25, 2025

egorification of Floer Homologies

575] how one can physically realize:

tion function of topological gauge theories on
uantum mechanics (SQM).
rtition function of topological gauge theories on
u-Ginzburg (LG) models.

-theoretic Floer homologies (as 0-categories) and FS-type
ntually allowed us to predict the existence of possibly higher

Objectives

This poster is based on our work [3, a
to:

1. Physically realize *novel* higher A_∞
gauge-theoretic Floer homologies
furnishing physical proofs and ger
conjectures by Bousseau-Doan-Re
2. Systematically extend the scheme

from Topological Gauge Theories with 16 Supercharges

× $\mathbb{R}_t$ with real, simple, and compact gauge group G

$$\left|^2 + \left|F^+_{\mu\nu} - \frac{1}{4}[B_\mu, B_\nu]\right|^2 - \frac{1}{2}D_t B_{\mu\nu}\right|^2 + \dots \Bigg) ,$$

$I_4 \times \mathbb{R}_t$, $\mathrm{ad}(G)$) and a self-dual two-form
$F^+ := (F + \star F)/2$ and $[B_\mu, B_\nu] \equiv g^{\rho\sigma}[B_\mu, B_{\nu\sigma}]$.

8d $\mathcal{N} = 1$ Spin(7) Theory

- Obtained via a "trivial" twist of 8d $\mathcal{N} = 1$ SYM on
and compact gauge group G [9]; it is topological in
- The bosonic sector of its action is given by:

$$S_{\mathrm{Spin}(7)} = \frac{1}{2e^2}\int_{\mathrm{Spin}(7)} d^8x\, \mathrm{Tr}\Big($$

with an irreducible gauge connection $A \in \Omega^1(\mathrm{Spin}(7$
$F^+ := (F + \star(\phi \wedge F))/2$ and ϕ is the self-dual Spin

-type A_∞-2-categories

ast as 3d gauged LG models on $\mathbb{R}^3$ in the irreducible
olomorphic superpotential $\mathcal{W}_D(\mathscr{Z})$, whose BPS
deformed Fueter equations:

$$^a - iF_{23} - jF_{31} - kF_{12} = g^{a\bar{b}}\left(\frac{e^{i\theta}\,\partial\mathcal{W}_D}{2\;\partial\mathscr{Z}^b}\right)^* . \qquad (1)$$

d LG SQM whose critical points now correspond to LG sheets
he 1d LG SQM will physically realize an intersecting Floer
ing thimbles ($\mathfrak{P}^{**,**}$) representing the LG sheets, which, in turn,

4d gauged LG models and Cauchy-Riemann-F

A_∞-3-categories

- Gauge theories on $M_D \times \mathbb{R}^1$ are first recast as 4d gauged LG
space of fields $(\mathscr{Z}, \overline{\mathscr{Z}})$ on M_D, with holomorphic superpot
equations are non-constant, gauged, θ-deformed Cauchy-Rie

$$\left(D_0 - \sum_{i=1}^{3} I_i D_i\right)\mathscr{Z}^a + I_1(F_{01} - F_{23}) + I_2(F_{02} + F_{13}) + I_3(F$$

- We further recast the theories as 1d LG SQM whose critical
threebranes in the equivalent 4d LG model. The 1d LG SQM

Pros & Cons of Checking My Poster Out

Pros

We will:

1. Realise Mathematical objects in Physics.
2. Perform a "physical proof" of Mathematical conjectures.
3. Predict new Mathematical results from Physics.
4. Enjoy a nice diagram to summarise the results of 3 paper.

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Cons

1. It's short: ~10 mins.

Tomorrow's Presentation

T18: Mathematical and Computational Physics

Friday, 26 Sept, 11:00am - Venue: Room 2; Chair: (TBD)

29 11:00am-11:15am	**Wenbo Wei, Nicholas Jia Le Chong, Choy Heng Lai, Ling Feng***: Multiple Descents in Deep Learning as a Sequence of Order-Chaos Transitions
51 11:15am -11:30am	**Arif Er*, Meng-Chwan Tan**: Topological 5d N=2 Gauge Theories: Mirror Symmetry and Langlands Duality of A-infinity-categories of Floer Homologies
168 11:30am -11:45am	**Po-Yen Lai***: Explaining the Bias Between Reanalysis Data and Observations During Heat Waves in East and Southeast Asian Cities: The Role of Urbanization and Urban Entropy