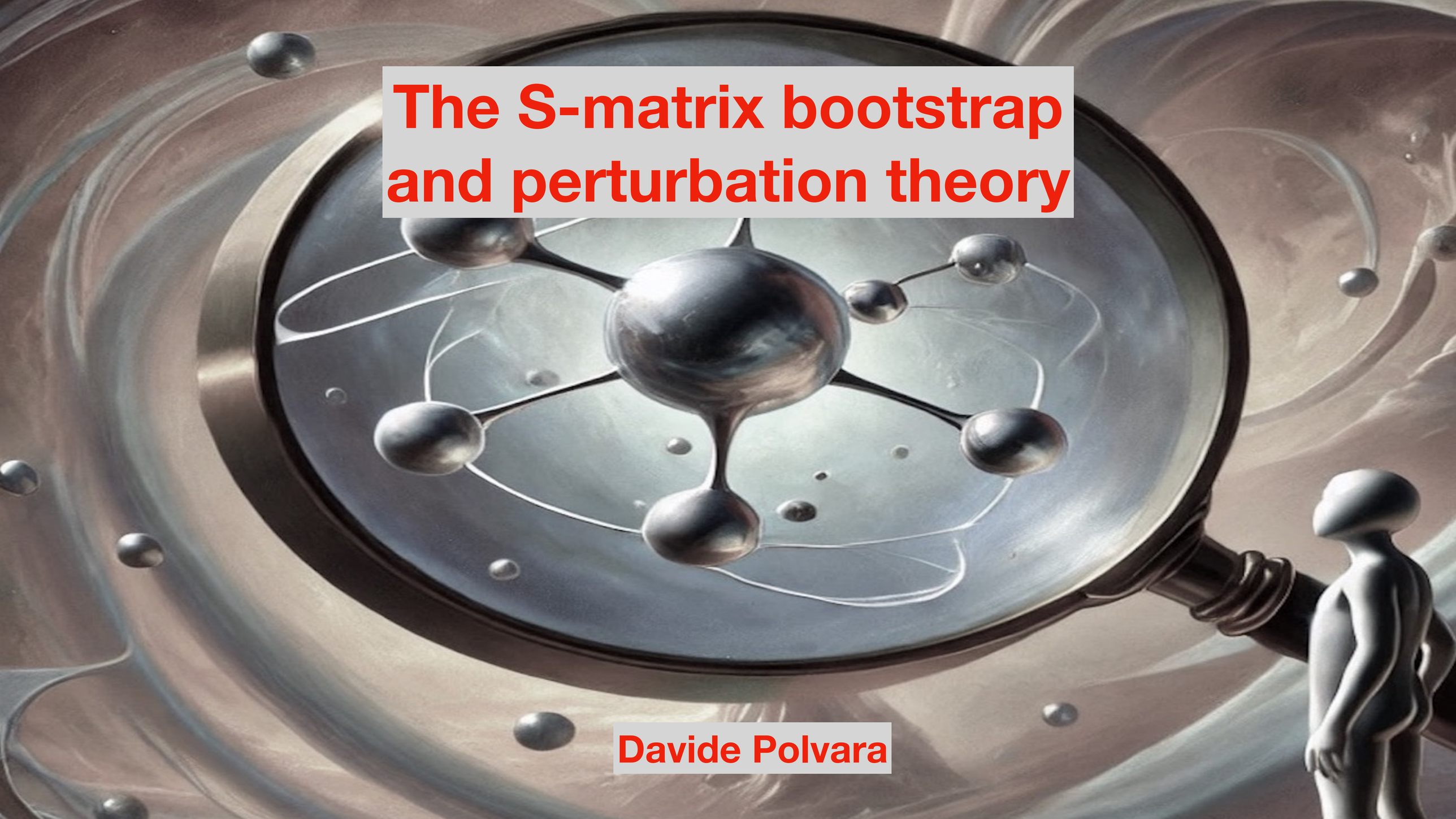

# The S-matrix bootstrap and perturbation theory

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PhD in Durham
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(2015-2018)


PostDoc in Padova
(2022-2024)

PostDoc in Hamburg
(now)

# About me:

Sweets

Adventure stories

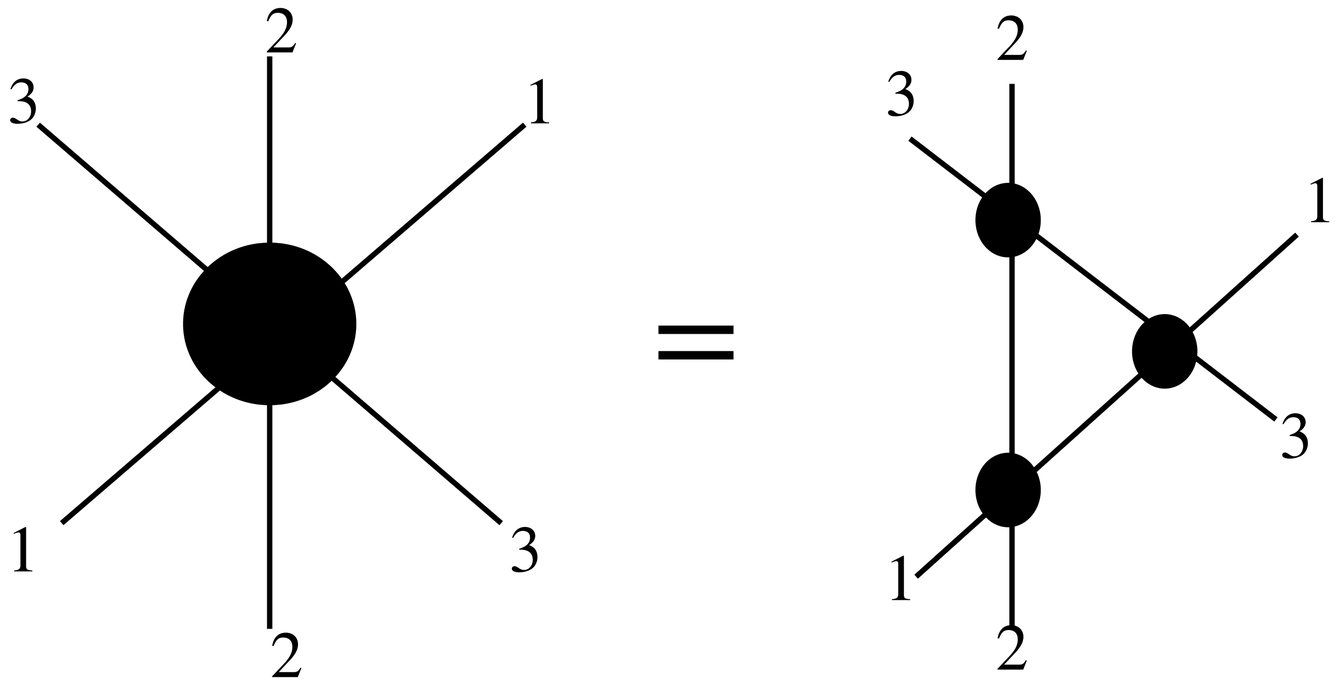
Mountains

Walking in the nature

Travelling

# About my work

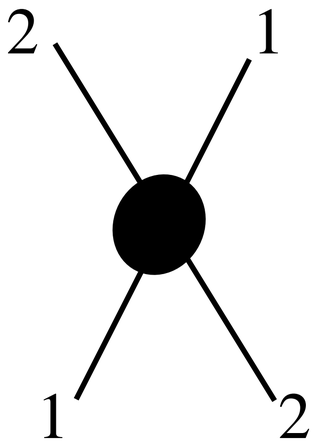
Understanding non-perturbative physics through integrability




$$S_{123} = S_{12}\, S_{13}\, S_{23}$$

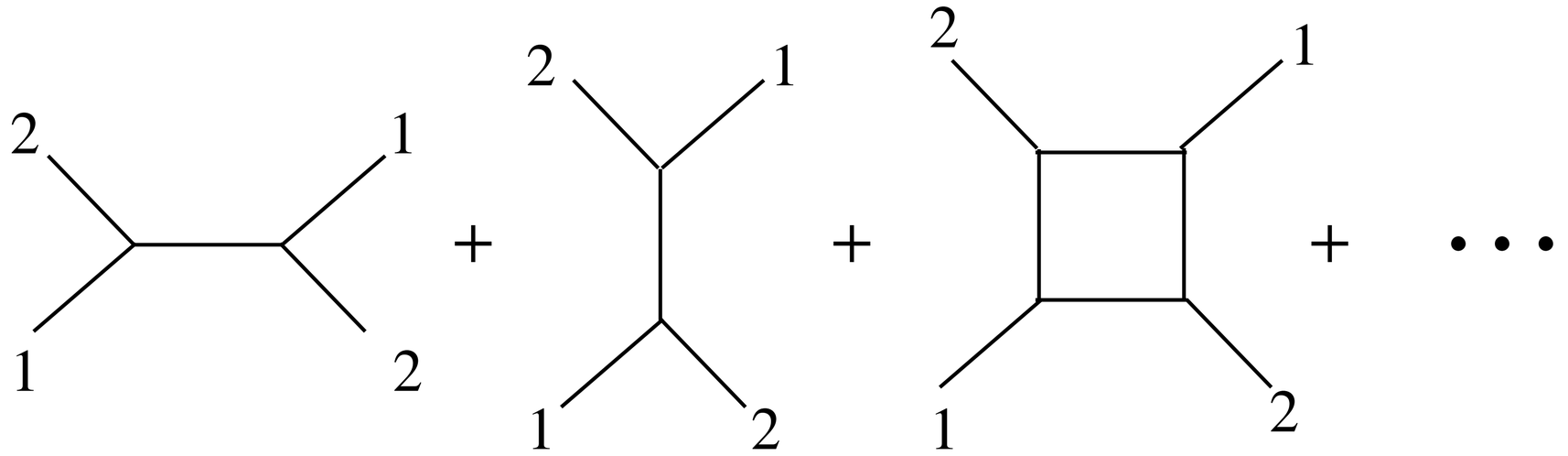
Bootstrap program: use axioms to construct 2-body S-matrices exactly

$S_{12} =$




Through axioms we solve algebraic equations and obtain the two body S-matrix exactly (bootstrap)

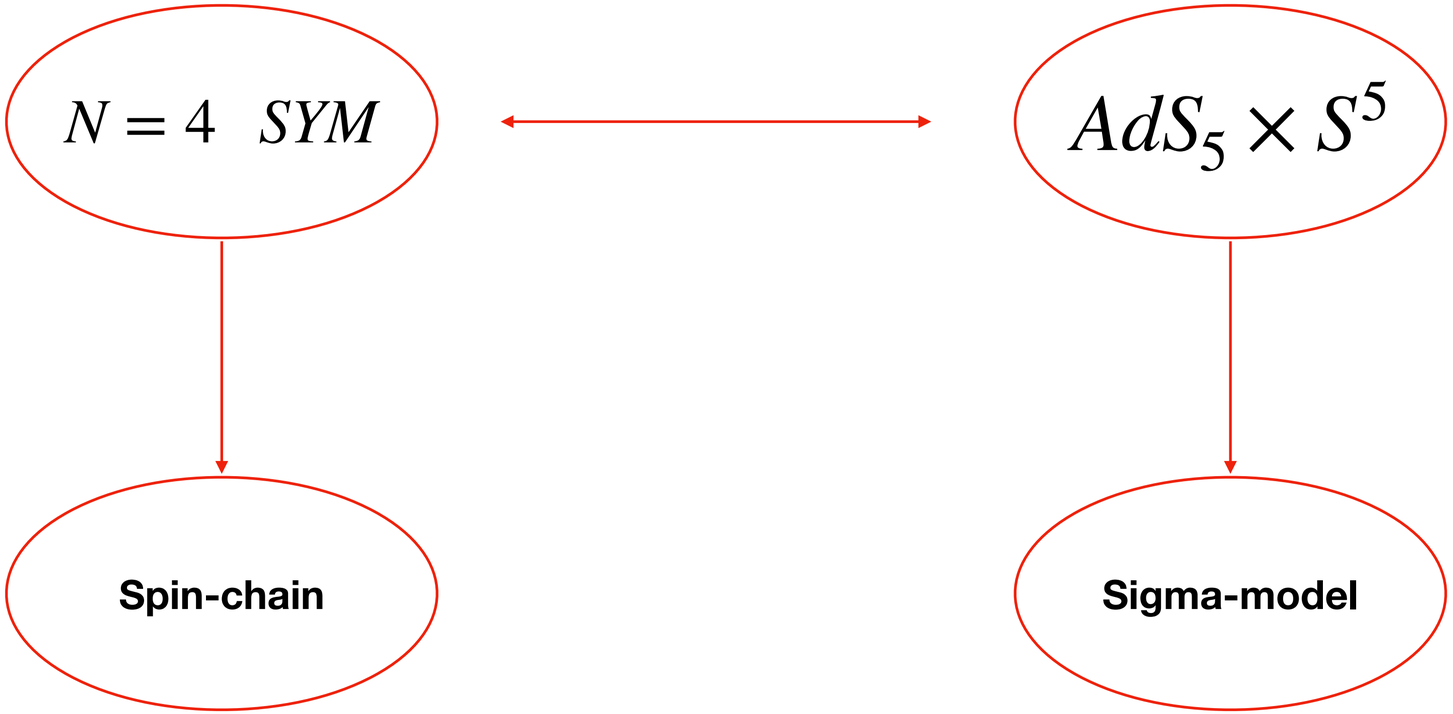
$S_{12} =$



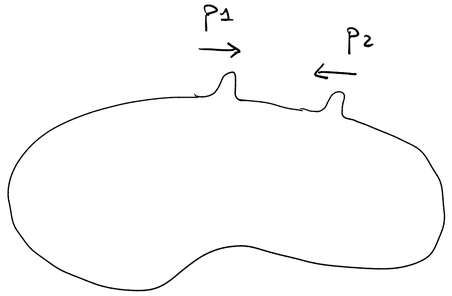

We obtain the S-matrix by summing over standard Feynman diagrams (perturbation theory).

In integrable models sums of Feynman diagrams simplify and we obtain in the end the exact S-matrix.

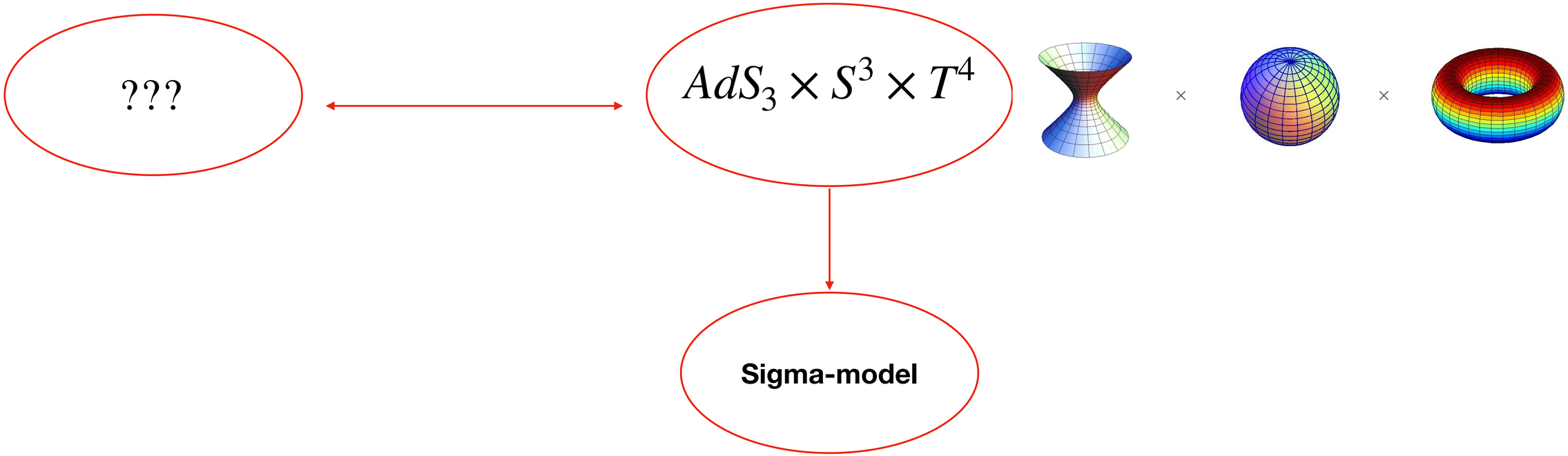
In the last 20 years integrability emerged in the context of the AdS/CFT correspondence




Integrable model for spectral problem
at finite value of ’t Hooft coupling



Another interesting instance of AdS/CFT correspondence:




$$S = -\frac{T}{2}\int d\tau d\sigma\, \sqrt{-\gamma}\gamma^{ab}G_{\mu\nu}(X)\partial_a X^\mu \partial_b X^\nu + \frac{k}{2\pi}\int d\tau d\sigma \epsilon^{ab}B_{\mu\nu}\partial_a X^\mu \partial_b X^\nu$$

There are two free parameters: $k \in \mathbb{N}$ $h \simeq T\sqrt{1-\frac{k^2}{4\pi^2 T^2}}$

# Thank you!