

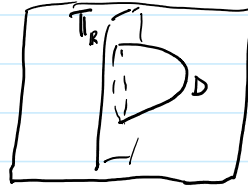
# Twistors & complex hyperkähler spaces:

## Discussion points:

1. Do the Complex HK spaces have split signature real slice  $M_{\mathbb{R}}$ ?

If so twistor space has real slice  $T_{\mathbb{R}}$

M. & LeBrun: (several papers)



$T \leftarrow$  Twistor space

Points in  $M_{\mathbb{R}}$   $\leftrightarrow$  holomorphic discs  $D$  in  $T$ ,  $\partial D \subset T_{\mathbb{R}}$   
many powerful analytic techniques!

2. Joyce-Bridgeland-Strachan HK Mfs admits  $\mathbb{C}^*$  symmetry:

4d: Quotient/symmetry  $\leftrightarrow$  Einstein-Weyl 3-space w/ extra structure (special congruence)

• Reduced twistor space admits poisson structure, eg. dKP

connect with geometries introduced by Dubrovin & Krichever '90s  
for Gromov-Witten/Selberg-Witten etc. All have hierarchies  
(W. Dunajski & Strachan).

3. Generating functions are  $\tau$ -functions for integrable hierarchies. = Correlation functions in 2d QFT.  
Jimbo-Miwa

Twistor interpretation? ~2000 w/ Singer & Woodhouse as QFT  
of sections of Ward bundle on  $\mathbb{CP}^1$  in twistor space.

2021.????: w/ Adams + Shrawan:

$W$  = Plekanski function = action of twistor lines  
for new twistor-string.

[new formulae for 4-d gravity amplitudes]

4 Y-systems for amplitudes at strong coupling

(after Alday + Maldacena).

AdS problem:

Amplitude = function on  $A_n$  cluster variety  
( $2n$  particles) (Area of minimal surface)

has special Kahler str. (Hitchin-like moduli at fixed point of  $\mathbb{Z}_2$ )

When extended to HK  $A_2$ -case = Bridgeland  $A_2$  case.  
(decoupling) (in conformal limit)

Does this extend? ie:  $A_n$ ,  $G(4,n)$ , ...  
(W. Hodge-like Form) Quantum Spectral Curve  $\rightarrow$  finite coupling? etc