

"Hodge star"

(with apologies to Simon Donaldson and Smash Mouth)

Somebody once told me
That up to homotopy,
The intersection form knows M^4
When pos def I was surprised
It can be diagonalized
And the proof uses physics and mo-ore:
Well, Yang-Mills starts running and it don't stop running
Take a nice twist if you've got enough cunning
Didn't make sense to path-integrate,
But still there's ways we can calculate.
Use $SU(2)$, use $SO(3)$,
And what's wrong with constants all called C
You'll never know if you don't go,
You're never fixed if you don't flow...

Chorus:

Hey now, you're the Hodge star, get your form on, go play,
Hey now, Yang-Mills 2-forms, take that space but, mod gauge
All Hodge-fixed things are gone,
Anti-self-dual forms are instantons...

It's a cool space, and looks good to first order
If you think it's smooth go look at the border
Simon Donaldson, he begs to differ
Judging by the cusps in his thesis's picture
So smooth it out, it's not too hard to mend
The intersection form is the same on both ends.
And what you get: his proof's scored
That's the way some $\mathbf{CP}^2$ s and M^4 co-bord

Chorus

Hey now, you're the Hodge star, get your form on, go play,
Hey now, you're an all-star, get your Fields on, get paid,
All Hodge-fixed things are gone,
Anti-self-dual fo-orms...

Somebody once asked
Why's this theory such a task

I hope things simplify at low energies,
I said yep, what a concept,
Seiberg-Witten theory does all that
So let us all use a Coulomb gaaaaaaauge
Well, Yang-Mills starts running and it don't stop running,
Low energy means there's something else coming
Didn't expect these new EOMs
The branes are hard and the math is dense
Use $SU(2)$ gauge symmetry,
Broken down to a $U(1)$ theory
You'll learn a remarkable fact (fact!)
Your moduli space is compact!

Hey now, you're the Hodge star, get your form on, go play,
Hey now, there's Dirac stars, new equations get made,
Whose zeros make manifo-olds,
Giving faster proofs than tools of o-old.
And all that glitters is go-old,
When topology meets monopo-oles.