MANY CHEERFUL FACTS

presents

Bell inequalities and Grothendieck's constant

a talk by William Slofstra

12:10 – 1:00pm on Wednesday, February 14, in room 1015.

Quantum mechanics can be counter-intuitive. It certainly was to certain famous physicists, who tried to develop a local hidden variable model for quantum mechanics. In 1964 J.S. Bell discovered upper bounds for correlations in local hidden variable models, and the subsequent experiments demonstrating that the real world does not obey Bell's inequalities are a convincing argument against local hidden variable theories.

There is more to this story. Later, Tsirelson observed that, while correlations observed in quantum mechanics do not satisfy Bell's inequalities, they cannot exceed Bell's bounds by more than a factor of Grothendieck's constant. This is surprising because Grothendieck's constant previously arose in the context of Banach spaces. I will explain the appearance of Grothendieck's constant in this context in the language of non-local games, and if time permits prove some bounds on Grothendieck's constant.

I am the very model of a modern Major General,
I've information vegetable, animal, and mineral,
I know the kings of England, and I quote the fights historical
From Marathon to Waterloo, in order categorical;
I'm very well acquainted, too, with matters mathematical,
I understand equations, both the simple and quadratical,
About binomial theorem I'm teeming with a lot o' news,
With many cheerful facts about the square of the hypotenuse!

- Gilbert & Sullivan $P \circ P$