

Smith Colloquium

Thursday, April 27, 2017

4:00 pm

306 Snow Hall

Aronszajn Seminar Room

Refreshments will be served at 3:30 pm in 406 Snow Hall.

The Amazing Poisson Calculation: A Method or a Trick?

Denis Bell

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The Gaussian function e^{-x^2} plays a central role in probability and statistics. For this reason, it is important to know the value of the Gaussian integral

$$I = \int_{-\infty}^{\infty} e^{-x^2} dx.$$

As is well-known, the function e^{-x^2} does not have an elementary antiderivative, so the above integral cannot be evaluated by the fundamental theorem of calculus. Most students of mathematics encounter, at some time or another, the following remarkable calculation, generally attributed to Poisson (though some say Gauss) for evaluating I . One forms the square of I , interprets this as a double integral in the plane, transforms to polar coordinates, and the answer magically pops out. In this talk we address the following question. Can Poisson's argument be used to evaluate other seemingly intractable integrals? The answer is rather surprising...