

## BOOK REVIEW

A review of *Elementary Introduction to Quantum Geometry*

By Jan Ambjorn

CRC Press, Abingdon, 2023, 292 pages, (£74.99 hardcover)

ISBN 978-1032335551

Scope: Textbook

Level: Researcher

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It is well known that general relativity is a theory of gravity that shows how gravity arises from the geometry of spacetime. On the other hand, quantum mechanics has nothing to do with geometry. Or does it? This series of lecture notes provides an account of how geometric ideas can be incorporated into quantum thinking, and how this might lead to insights into how to set up a theory of quantum gravity.

After an initial romp through path integrals and their evaluation for a free relativistic particle, looking particularly at the treatment of random walks, the lecture notes then go on to demonstrate that the paths in these integrals need to be formulated with respect to the spacetime metric. A connection is made with the theory of branched polymers, and ideas from that field are then used to treat random surfaces and bosonic strings, thereby setting up some toy models of quantum gravity in two dimensions.

The text reads like a set of lecture notes, and you can see how it has developed out of a real course that was designed to teach people the material. One sometimes misses an overarching perspective or some signposting of where the argument is going, but the treatment feels fresh and lively, with some nicely worked through examples. A particularly attractive feature of the book is the large number of problems given in one of the appendices, with another appendix containing their solutions. Another appendix contains a first-rate primer on Green's functions, which also comes bundled with further problems and their solutions. This is a book you can learn from.

The review copy was an e-book, which looks extremely poorly typeset with funny indents after each equation (offending only my aesthetic sensibilities) and has all the Dirac bras and kets missing, (rendering some of the equations rather confusing, a more serious offence). The book preview I was able to see on the amazon website seems to indicate that these defects are not a feature of an actual printed copy, so anyone wishing to engage with this material would be well advised to steer clear of the e-book and get hold of a physical version.