



Gravity's Engines: the other side of black holes

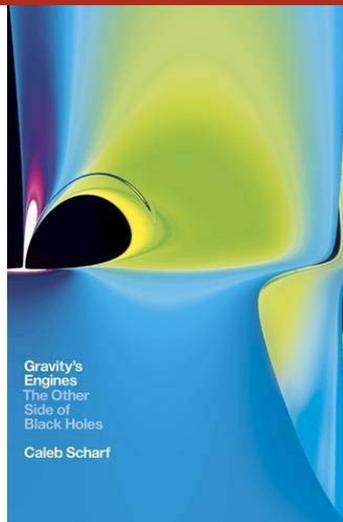
by Caleb Scharf

Allen Lane, 2012. ISBN 978-1-846-14533-9. Pp 252, £20 (hbk).

Caleb Scharf is one of those astronomers who have acquired the knack of writing as if he were talking to you, personally, in the pub. He is director of Columbia Astrophysics Centre and married with two daughters.

This book is mainly concerned with black holes (often very massive black holes) and their effects on their host galaxies. Did you know that a black hole's immediate surroundings can act like an electrostatic generator? This is just one way a black hole can be a source of enormous energy. There's no more than a passing reference to the interior and gateways to other universes and a good thing, too.

Scharf opens with an X-ray image of 4C41.17 and matches history to the flight of the photons from there to here. A brisk run through from Michell's precursor of the black hole through Einstein to Kerr gets the reader up to speed with the concepts, particularly of the rotating black hole. In the process, we learn that black holes may only spin so fast and this puts limits on



their voracity and increases the energy output.

He acknowledges the work of others in unravelling the images of faint distant clusters of galaxies, their clouds of dusty gas and massive black holes. I liked the candour: there are several scenarios for the formation of massive black holes and the choice is not yet made.

In the final chapters, Scharf puts forward startling ideas that the central black holes may have a big role in shaping their galaxies into 'red' ellipticals or 'blue' spirals, with just a few 'green valley' spirals such as (fortunately!) our own Milky Way that may have stars of the

right ages and types for their planets to harbour life. Yet, within the past 25,000 years, the Milky Way's black hole has blown two huge bubbles, detected with gamma rays.

There's a lot in this book. Because of that, it's not always an easy read, but it is well worth the effort.

Roger O'Brien

Roger has been an amateur astronomer since 1957. He worked in a bank for 26 years, then went to university and got a degree in astronomy. Now he is a tutor (in astronomy and planetary science) for the Open University and lectures in astronomy for other institutions.

This review is copyright © the *Journal* of the British Astronomical Association, www.britastro.org/journal. If you wish to reproduce it, or place it on your own Web page, please contact the Editor: Mrs Hazel McGee, [hazelmcee "at" btinternet.com](mailto:hazelmcee@btinternet.com)