A year of XMM-Newton

Peter Bond sums up the good start made by the X-ray observatory.

The X-ray equivalent of the Hubble Deep Field: an XMM-Newton image of the Lockerman Hole, which led to the detection of more than 200 new sources.

The spectacular trails of dust and gas drawn out when one galaxy approaches another have become almost a familiar sight among the powerful images produced from modern telescopes. This image too shows a long dusty trail stretching out as if flowing towards another galaxy, but none can be seen.

Neil Trentham and Enrico Ramirez-Ruiz of the Institute of Astronomy at the University of Cambridge and Ole Moller, formerly at the Cavendish Laboratory in Cambridge and now at the University of Groningen in The Netherlands, suggest that there is indeed a galaxy there, but one made of the elusive dark matter. “Observationally, a picture is emerging that there is a lot of dark matter in the universe and that most galaxies possess a great deal of it,” says Trentham. “On the theory side, the cold dark matter theory predicts that there are many low-mass galaxies for every massive one, but we don’t see many of them around. That could simply be because very few stars – perhaps none at all – have formed in them. So the question is, ‘How do we look for these completely dark galaxies’?”

Trentham, Moller and Ramirez-Ruiz have several suggestions in their paper, soon to be published in Monthly Notices. If the dark matter is composed entirely of fundamental particles, dark galaxies may act as gravitational lenses, distorting the appearance of distant galaxies that happen to lie behind them. If the dark matter includes some brown dwarfs, their infrared radiation may be detectable. The same will be true if the galaxies contain any dead stars, such as white dwarfs or black holes. If they are nearby, it might be possible to detect these stellar remnants acting as gravitational lenses on the light of individual stars in other galaxies beyond them. Several lensing events in a small area of sky would suggest the presence of a dark galaxy.

The authors even go so far as to suggest that galaxies made completely of dark matter may be common, possibly even outnumbering visible galaxies by as much as 100 to 1. Jacqueline Mitton.