

# Dark matter haloes favour frisbee over rugby (Forwarded)

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### DARK MATTER HALOES FAVOUR FRISBEE OVER RUGBY

A new study of dark matter haloes indicates that they are shaped like Frisbees, not Rugby-balls as has preferentially been suggested. Aaron Robotham, of the University of Bristol, will be presenting the results at the Royal Astronomical Society's National Astronomy Meeting in Preston on Friday 20th April.

A group from the University of Bristol and the Cerro-Tololo Inter-American Observatory in Chile has developed a sophisticated computer model to work out the three-dimensional shape of the dark matter using the positions of groups of galaxies which are embedded the haloes. Dark matter haloes are studded with galaxies but being discrete objects the true halo shape may not be apparent by just simply measuring their distribution. The new model is able to fill in the gaps with an unprecedented degree of accuracy, presenting a truer picture of the shape of the ellipsoids. The results for the corrected data show that the dark matter haloes are non-spherical but flattened out like a Frisbee, most preferentially in the smallest groups of galaxies. When the group had analysed the raw data the ellipsoids had appeared to be shaped like a Rugby ball or American Football, which was also the shape preferred by previous studies.

"Our findings are that dark matter haloes are Frisbee shaped, that means that dark matter is not simply spherically distributed, and indicates that filamentary structure is not a strong influence on the shape of the group halo -- prolate shapes would be strongly favoured in this case," said Robotham. "The apparent oblate shapes that are allowed after correction mirrors that seen for the Local Group and has often been suggested in computer models."

The shape of dark matter haloes gives us information about how the early universe formed and how the haloes have evolved. According to cosmological theory, soon after the Big Bang cold dark matter formed the universe's first large-scale structures, which then collapsed under their own weight to form vast halos. The gravitational pull of these haloes sucked in normal matter and provided a focus for the formation of galaxies. How the shape of these halos have evolved over time is a subject of much debate, complicated by a vast number of factors that mean extremely large samples are required in order to extract meaningful statistics.

The scientists used the 2-degree Field Percolation Inferred Galaxy Groups (2PIGG) catalogue, the largest survey of galaxy groups that is publicly available. The group's findings have been submitted for publication in the *Astrophysical Journal*.

NOTES FOR EDITORS

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### Royal Astronomical Society's National Astronomy Meeting

The RAS National Astronomy Meeting is the UK's premier meeting for the astronomy, solar system and space science communities. The RAS–NAM 2007 is hosted by the University of Central Lancashire and is joined by the UK Solar Physics and Spring MIST meetings. It is sponsored by the Royal Astronomical Society, the UK Science and Technology Facilities Council (STFC) and the University of Central Lancashire.

### IMAGES

Images can be found at

[http://www.ras.org.uk/index.php?option=com\\_content&task=view&id=1181](http://www.ras.org.uk/index.php?option=com_content&task=view&id=1181)