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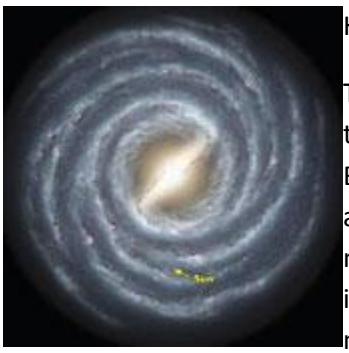
A bar in milky way

There's more than a black hole at the core of our galaxy, writes Biman Nath



Heart of the matter: Milky Way galaxy, viewed by *Spitzer*

There may not be a restaurant at the end of the Universe, but there seems to be a bar in our Milky Way,'' ' that's how Leo Blitz, an astronomer from Berkeley (then at Maryland), concluded his talk at a meeting of American astronomers 15 years ago. He and his collaborators had analysed the motion of stars near the centre of the Milky Way and found hints of irregularities in their movements. They inferred that such deviations from normal orbits would mean the presence of an agglomeration of matter in the form of a rod or a bar. But it was an indirect evidence at best, and astronomers have since been looking for some hard evidence for such a structure in the heart of the Milky Way.

And the latest studies from a recently launched infrared telescope orbiting the earth seem to vindicate the early ideas.

Why infrared' Because only infrared rays can penetrate the dust and gas in our galaxy and look at the heart of the Milky Way clearly. Our galaxy has the shape of a thin disk. The sun and the solar system are situated at the outer rim of this disk which is full of stars as well as a large amount of diffuse gas and dust. They block our view of the centre of the Milky Way, and limit the power of the optical telescopes to view our neighbourhood stars.

What one needs is a kind of light with long wavelengths so that it can skirt around the blocking grains of dust and reach us. It turns out that infrared light, with a wavelength of a few microns (a micron is a millionth of a metre), can be used to peer at the centre of our galaxy, and also at the heart of other galaxies.

The technology of detecting these rays with high precision, however, has been slow in coming, and only recently has NASA launched a few satellites with infrared telescopes (to avoid the absorption of infrared

rays by our atmosphere). One such telescope is the *Spitzer Space Telescope*, named after Lyman Spitzer, one of the pioneers who studied dust in space.

The telescope has helped a team of American astronomers gaze at the distribution of millions of stars in the vicinity of the Milky Way's centre. Their observation totalled 400 hours, and the analysis of the data took up a year. They have found that there is indeed a structure in the shape of a bar there. It is made of old and red stars and is about 27,000 light-years in length, somewhat longer than previously believed. The bar is at an angle of 45 degrees to the imaginary line between our sun and the centre of the Milky Way. The tip of the bar reaches about halfway to the sun.

Does the finding make our galaxy peculiar in any way' Not quite. About a third of all galaxies with spiral arms like our Milky Way seem to have this bar-like structures at their centres. There has been a lot of speculation about the origin and implication of such structures.

Most theorists think that a bar-like structure develops when a galaxy gravitationally interacts with a neighbouring one. This kind of an agglomeration of matter then distorts the orbits of stars and gas in the centres of galaxies, and funnels the stars and gas towards the black holes lurking in the centre. But the details of these processes are still not understood. Also, it's not clear what makes the bar so stable that it lasts for a long time; if it had been a transient feature in the life of a galaxy, then such structures would have been rare in the Universe.

The bar at the centre of the Milky Way seems to be longer than astronomers had assumed earlier. We are lucky that our solar system is situated at the outskirts of the Milky Way, far away from the hustle-bustle of the central parts. Since the bar tugs along stars and gas, and carries them towards the black hole at the centre, our solar system might have been swallowed by the monster long ago if it were much closer to the centre than it is really.

The bar at the centre of the Milky Way appears to have been used by the black hole to lure away unwary denizens of the galaxy into fatal orbits around it and to devour them eventually. Not unlike some singles bars where some characters prowl for companions. Astronomers seem to have finally found the extent of the feeding zone of the black hole at the centre of the Milky Way.