Hassled galaxy 'thriving on chaos'

March 11 2005

Powerful but unknown forces are at work in a small companion galaxy of the Milky Way, astronomers say in today's issue of the journal Science.
Something is keeping the structure and magnetic field of this galaxy–the Large Magellanic Cloud–strong and ordered, even while the Milky Way's gravity works to tear them apart.
A team led by Bryan Gaensler of the HarvardSmithsonian for Astrophysics used the CSIRO Australia Telescope near Narrabri in NSW to study the galaxy's magnetic field.

"This is the most detailed map ever made of another galaxy's magnetism," says Gaensler.

At just 160 000 light-years away the Large Magellanic Cloud, or LMC, is the Milky Way's closest neighbour and is being clawed apart by the Milky Way's gravity. The researchers were surprised that the LMC's magnetic field is so smooth and ordered, given the internal turmoil the galaxy must experience.

"It's like having a birthday party all afternoon for a bunch of 4-year-olds, and then finding the house still neat and tidy when they leave," Gaensler says. "Some powerful forces must be at work to keep the magnetic field from being messed up."

The Milky Way and many other large spiral galaxies have well-organised, large-scale magnetic fields. It's thought that the overall rotation of these galaxies combines and smooths out the small-scale

magnetic fields created by whirls and eddies of gas. The process is called a 'dynamo', and is similar to the process that produces the Earth's magnetic field.

"But if a galaxy experiences sudden bursts of star formation or supernova explosions, the energy that these processes release should completely disrupt the large-scale magnetic field," says Lister Staveley-Smith of the CSIRO Australia Telescope National Facility. "And we know the LMC has had those kind of violent events over the last several thousand million years," he says.

So what keeps the LMC's magnetic field in order? There are several possibilities, the researchers say, but the process they favour is one driven by extremely energetic particles called 'cosmic rays'. This would take effect more quickly than the conventional dynamo mechanism. It also requires vigorous star formation to operate, so "stars bursting out at random all over would strengthen the magnetic field, not mess it up," says Gaensler. "You could say this galaxy is thriving on chaos."

Source: CSIRO

Citation: Hassled galaxy 'thriving on chaos' (2005, March 11) retrieved 26 April 2024 from https://phys.org/news/2005-03-hassled-galaxy-chaos.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.