Milky Wayâ€™s black hole seen as particle smasher

by Bend_Weekly_News_Sources

SciÂ-enÂ-tists were starÂ-tled to find in 2004 that the cenÂ-ter of our galÂ-axy is emitÂ-ting gamÂ-ma rays, the highest-enÂ-erÂ-gy form of light. Now asÂ-tÂ-roÂ-physÂ-iÂ-cists say theyâ€™ve disÂ-covÂ-ered what might proÂ-duce these.

A black hole beÂ-lieved to lurk in that place, they proÂ-pose, could be a cosÂ-mic form of parÂ-tÂ-iÂ-cle acÂ-celÂ-erÂ-aÂ-torâ€”a maÂ-chine built to smash subÂ-aÂ-toÂ-mic parÂ-tÂ-iÂ-cles toÂ-gethÂ-er in orÂ-der to unÂ-derÂ-stand their comÂ-poÂ-nents.The black hole, acÂ-cordÂ-ing to this view, would rev up parÂ-tÂ-iÂ-cles known as proÂ-tons, parts of the cores of orÂ-diÂ-nary atoms, and smash them at near-light speeds inÂ-to lowÂ-er enÂ-erÂ-gy proÂ-tons. The colÂ-liÂ-sions would proÂ-duce gamÂ-ma rays.â€œItâ€™s siÂ-mÂ-iÂ-lar to the same kind of parÂ-tÂ-iÂ-cle physÂ-ics exÂ-perÂ-iÂ-ments that the Large HadÂ-ron ColÂ-lidÂ-er,â€• a next-generation acÂ-celÂ-erÂ-aÂ-tor in SwitzÂ-erÂ-land, will perÂ-form, said DaÂ-vid BalÂ-lanÂ-tyne of the UniÂ-verÂ-siÂ-ty of ArÂ-iÂ-zoÂ-na in TucÂ-son, Ariz. That maÂ-chine is due to start opÂ-erÂ-atÂ-ing this year. A graphÂ-ic ilÂ-lusÂ-tratÂ-ing the idea that the black hole at the cenÂ-ter of the Milky Way is like an exÂ-tremeÂ-ly powÂ-erÂ-ful parÂ-tÂ-iÂ-cle acÂ-celÂ-erÂ-aÂ-tor, revÂ-ving up proÂ-tons in the surÂ-roundÂ-ing magÂ-netÂ-ic plasÂ-ma and slingÂ-ing them inÂ-to lower-enÂ-erÂ-gy proÂ-tons with such enÂ-erÂ-gy that high-enÂ-erÂ-gy gamÂ-ma rays reÂ-sult from the colÂ-liÂ-sion. The yelÂ-low line deÂ-picts a high-enÂ-erÂ-gy proÂ-ton flung inÂ-to a lower-enÂ-erÂ-gy proÂ-ton in a cloud of hyÂ-droÂ-gen gas. The green arÂ-row repÂ-reÂ-sents the high-enÂ-erÂ-gy gamÂ-ma ray that reÂ-sults from the colÂ-liÂ-sion. (CredÂ-it: SarÂ-ah BalÂ-lanÂ-tyne)
BalÂ-lanÂ-tyne and colÂ-leagues wrote a paÂ-per on the findÂ-ings pubÂ-lished in the March isÂ-sue of AsÂ-tÂ-roÂ-physÂ-iÂ-cal JourÂ-nal LetÂ-ters, a reÂ-search pubÂ-liÂ-caÂ-tion.The Large HadÂ-ron ColÂ-lider is exÂ-pectÂ-ed to be able to acÂ-celÂ-erÂ-ate proÂ-tons to sevÂ-en trilÂ-lion elecÂ-tronÂ-volts, a measÂ-ure of enÂ-erÂ-gy. Our galÂ-axÂ-yâ€™s black hole whips proÂ-tons to up to 100 trilÂ-lion elecÂ-tronÂ-volts, acÂ-cordÂ-ing to the new stuÂ-dy. Thatâ€™s all the more imÂ-presÂ-sive beÂ-cause â€œOur black hole is pretÂ-ty inÂ-acÂ-tive comÂ-pared to masÂ-sive black holes sitÂ-ting in othÂ-er galaxÂ-ies,â€• BalÂ-lanÂ-tyne said.A black hole is an obÂ-ject so tightÂ-ly comÂ-pressed that its own weight creÂ-ates gravÂ-iÂ-ty that sucks in anÂ-yÂ-thing withÂ-in a cerÂ-tain range, inÂ-cludÂ-ing light. Most gaÂ-laxÂ-ies are thought to harÂ-bor centÂ-ral, huge black holes dubbed suÂ-perÂ-masÂ-sive black holes.PowÂ-erÂ-ful, chaÂ-otÂ-ic magÂ-netÂ-ic fields acÂ-celÂ-erÂ-ate proÂ-tons and othÂ-er parÂ-tÂ-iÂ-cles near our black hole to exÂ-tremeÂ-ly high enÂ-erÂ-gies, BalÂ-lanÂ-tyneâ€™s team arÂ-gued. â€œOur galÂ-axÂ-yâ€™s cenÂ-tral supermasÂ-sive obÂ-ject has been a conÂ-stant source of surÂ-prise evÂ-er since its disÂ-covÂ-ery some 30 years ago,â€• said the UniÂ-verÂ-siÂ-ty of ArÂ-iÂ-zoÂ-naâ€™s FulÂ-vio Melia, a colÂ-labÂ-oÂ-raÂ-tor in the study. â€œSÂ-lowly but sureÂ-ly it has beÂ-come the best studÂ-ied and most comÂ-pelÂ-ling black hole in the uniÂ-verse. Now weâ€™re even findÂ-ing that its apÂ-parÂ-ent quiÂ-etÂ-ness over much of the [light] specÂ-trum beÂ-lies the real powÂ-er it genÂ-erÂ-ates a mere breath above its event horiÂ-zonâ€”the point of no reÂ-turnâ€• past which noÂ-thing can esÂ-cape its grip.The Milky Way black hole â€œis one of the most enÂ-erÂ-getÂ-ic parÂ-tÂ-iÂ-cle acÂ-celÂ-erÂ-aÂ-tors in the galÂ-axy, but it does this by proxy,â€• Melia said. It caÂ-joles a magÂ-netÂ-ized plasÂ-ma, or eÂ-lecÂ-triÂ-calÂ-ly charged gas thatâ€™s â€œhapÂ-lessÂ-ly trapped withÂ-in its clutches, inÂ-to slingÂ-ing proÂ-tons to unÂ-earthÂ-ly speeds.â€•

Courtesy University of Arizonaand World Science staff