'Superstrings' could raise cosmic clatter

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AlÂ-bert EinÂ-stein theÂ-oÂ-rized long ago that movÂ-ing things would warp the fabÂ-ric of space and time, which acÂ-cordÂ-ing to his findÂ-ings are unitÂ-ed as a four-diÂ-menÂ-sional space-time. As the obÂ-jects travÂ-eled, they would alÂ-so emÂ-aÂ-nate ripÂ-ples of gravÂ-iÂ-ty called gravÂ-iÂ-taÂ-tionÂ-al waves.

No one has deÂ-tected that yet, but some reÂ-searchÂ-ers beÂ-lieve they could find such waves comÂ-ing from strange, wispy cosÂ-mic strucÂ-tures called suÂ-perÂ-strings. CosÂ-mic suÂ-perÂ-strings are theÂ-oÂ-rized to wigÂ-gle and osÂ-cilÂ-late, proÂ-ducÂ-ing gravÂ-iÂ-taÂ-tionÂ-al waves, and then to slowÂ-ly shrink as they lose enÂ-erÂ-gy unÂ-til they disÂ-apÂ-pear. (CourÂ-teÂ-sy UniÂ-verÂ-siÂ-ty of WashÂ-ingÂ-ton.) Many physÂ-iÂ-cists are inÂ-terÂ-estÂ-ed in a comÂ-plex, controÂ-versial set of ideas called string theÂ-oÂ-ry, which casts the four basÂ-ic forcÂ-es idenÂ-tiÂ-fied in naÂ-ture as manÂ-iÂ-fesÂ-taÂ-tion of one, unÂ-derÂ-lyÂ-ing force. The four are called elecÂ-troÂ-magÂ-netism, weak, strong and gravÂ-iÂ-ty.String theÂ-oÂ-ry is someÂ-times critÂ-iÂ-cized for beÂ-ing unÂ-testÂ-aÂ-ble, even unÂ-sciÂ-enÂ-tifÂ-ic. But some verÂ-sions of it preÂ-dict the forÂ-maÂ-tion of exÂ-otÂ-ic strucÂ-tures that the reÂ-searchÂ-ers say would have obÂ-servÂ-aÂ-ble efÂ-fects: cosÂ-mic suÂ-perÂ-strings. These are narÂ-row tubes of enÂ-erÂ-gy left over from the beÂ-ginÂ-ning of the uniÂ-verse, and stretched to enorÂ-mous lengths by the exÂ-panÂ-sion of the uniÂ-verse, said cosÂ-molÂ-oÂ-gist Craig HoÂ-gan of the UniÂ-verÂ-siÂ-ty of WashÂ-ingÂ-ton in Seattle, Wash.If the theÂ-oÂ-ry is corÂ-rect, there are countÂ-less cosÂ-mic suÂ-perÂ-strings stretched like galaxy-sized rubÂ-ber bands, he added. They reÂ-semÂ-ble ultra-thin tubes with some of the earÂ-ly uniÂ-verse preÂ-served inÂ-side, HoÂ-gan said. The strings can form inÂ-to loops that flop around and emit gravÂ-iÂ-taÂ-tionÂ-al waves. In the proÂ-cess, they give off their enÂ-erÂ-gy and eventually disÂ-apÂ-pear. â€œTheyâ€™re so light that they canâ€™t have any efÂ-fect on cosÂ-mic strucÂ-ture, but they creÂ-ate this bath of gravÂ-iÂ-taÂ-tionÂ-al waves just by deÂ-cayÂ-ing,â€• he said.TheÂ-oÂ-ry holds that eveÂ-ry time someÂ-thing moves it emits a gravÂ-iÂ-taÂ-tionÂ-al wave. ColÂ-lidÂ-ing black holes would send out more waves than anÂ-ything, typÂ-iÂ-calÂ-ly a milÂ-lion times more powÂ-er than is proÂ-duced by all the galaxÂ-ies in the uniÂ-verse. Some gravÂ-iÂ-taÂ-tionÂ-al waves could theÂ-oÂ-retÂ-iÂ-cally be heard, HoÂ-gan said. But most have a freÂ-quenÂ-cy, or speed of viÂ-braÂ-tion, too low to hearâ€”10 to 20 ocÂ-taves, or full scales, beÂ-low the range of huÂ-man hearÂ-ing. â€œBig massÂ-es tend to take a long time to move about, so there are more sources at lowÂ-er freÂ-quenÂ-cies,â€• he said. â€œSensÂ-ing these viÂ-braÂ-tions would add the soundÂ-track to the beauÂ-tiÂ-ful imÂ-ageÂ-ry of asÂ-tronÂ-oÂ-my.â€•A proÂ-posed orÂ-bitÂ-ing obÂ-servÂ-aÂ-toÂ-ry called the LaÂ-ser InÂ-terÂ-ferÂ-omÂ-etry Space AnÂ-tenÂ-na, beÂ-ing deÂ-velÂ-oped by NASA, could proÂ-vide the first meaÂ-sureÂ-ments of very low freÂ-quenÂ-cy gravÂ-iÂ-taÂ-tionÂ-al waves, perÂ-haps the first such meaÂ-sureÂ-ments at any freÂ-quenÂ-cy, HoÂ-gan said. In adÂ-diÂ-tion to the exÂ-pected wave sources, these sigÂ-nals alÂ-so might come from suÂ-perÂ-stringsâ€”providing the first â€œreal physÂ-iÂ-cal evÂ-iÂ-dence that these strings exÂ-ist,â€• he said.HoÂ-gan and Matt DeÂ-Pies, a docÂ-torÂ-al stuÂ-dent at the uniÂ-verÂ-siÂ-ty, were schedÂ-uled to preÂ-sÂ-ent calÂ-cuÂ-laÂ-tions for gravÂ-iÂ-taÂ-tionÂ-al waves genÂ-erÂ-atÂ-ed by cosÂ-mic strings, as well as the largÂ-er raÂ-tionÂ-ale for the space anÂ-tenÂ-na misÂ-sion, on MonÂ-day at the AmerÂ-iÂ-can AsÂ-troÂ-nomÂ-iÂ-cal SoÂ-ciÂ-eÂ-ty naÂ-tionÂ-al meetÂ-ing in SeÂ-atÂ-tle.An Earth-based projÂ-ect called the LaÂ-ser InÂ-terÂ-ferÂ-omÂ-etry Gravitational-Wave ObÂ-servÂ-aÂ-toÂ-ry alÂ-so is tryÂ-ing to obÂ-serve gravÂ-iÂ-taÂ-tionÂ-al waves. But itâ€™s searchÂ-ing in highÂ-er freÂ-quenÂ-cies where HoÂ-gan beÂ-lieves waves from suÂ-perÂ-strings would be much harder to deÂ-tect, beÂ-cause of backÂ-ground noise. â€œThe strings, if they exÂ-ist, are part of that noise, but we want to lisÂ-ten in at lowÂ-er freÂ-quenÂ-cies and try to deÂ-tect them,â€• he said.

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