First stars may have been supergiants, researchers say

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New telÂ-eÂ-scope obÂ-serÂ-vaÂ-tions have bolÂ-stered a claim that asÂ-troÂ-noÂ-mers have seen the uniÂ-verseâ€™s first luÂ-miÂ-nous obÂ-jectÂ-sâ€”posÂ-sibÂ-ly garÂ-ganÂ-tuÂ-an stars, reÂ-searchÂ-ers say.If the findÂ-ings prove corÂ-rect, sciÂ-enÂ-tists add, they might fit with a theÂ-oÂ-ry that such stars seeded the growth of the bigÂ-gest, so-called suÂ-perÂ-masÂ-sive, black holes. Black holes are obÂ-jects so heavy and comÂ-pact that their gravÂ-iÂ-ty sucks in eveÂ-ryÂ-thing nearÂ-by, inÂ-cludÂ-ing light.

The botÂ-tom panÂ-el is an imÂ-age from NASA's Spitzer Space TelÂ-eÂ-scope, of stars and galaxÂ-ies in the UrÂ-sa MaÂ-jor conÂ-stelÂ-laÂ-tion. This inÂ-fraÂ-red imÂ-age coÂ-vers a reÂ-gion of space so large that light would take up to 100 milÂ-lion years to travÂ-el across it. The top panÂ-el is the same imÂ-age afÂ-ter stars, galaxÂ-ies and othÂ-er sources were masked out. The reÂ-mainÂ-ing backÂ-ground light, acÂ-cordÂ-ing to some asÂ-troÂ-noÂ-mers, is from a time when the uniÂ-verse was less than a bilÂ-lion years old, and probÂ-aÂ-bly origÂ-iÂ-natÂ-ed from the uniÂ-verse's first groups of obÂ-jects. Darker shades in the top imÂ-age corÂ-reÂ-spond to dimÂ-mer parts of the glow; yelÂ-low and white show the brightÂ-est. But some reÂ-searchÂ-ers said theyâ€™re not conÂ-vinced the findÂ-ings are corÂ-rect.AcÂ-cordÂ-ing to those who reached them, their new obÂ-serÂ-vaÂ-tions, from NASAâ€™s Spitzer Space TelÂ-eÂ-scope, strongly sugÂ-gest clumps of the priÂ-mordÂ-ial obÂ-jectsâ€”posÂ-sibÂ-ly stars or black holesâ€”are resÂ-ponÂ-siÂ-ble for inÂ-fraÂ-red light seen in an earÂ-liÂ-er stuÂ-dy. InÂ-fraÂ-red is a form of light too low in enÂ-erÂ-gy to be diÂ-rectÂ-ly visÂ-iÂ-ble, but deÂ-tectÂ-aÂ-ble with suitÂ-aÂ-ble inÂ-struÂ-ments.The new daÂ-ta show this patchy light is splatÂ-tered sky-wide and comes from clusÂ-ters of bright, monÂ-sÂ-trous obÂ-jects more than 13 bilÂ-lion light-years away, the asÂ-tÂ-roÂ-noÂ-mers said. A light-year is the disÂ-tance light travÂ-els in a year. This would mean the light from those boÂ-dies has been traÂ-vÂ-elÂ-ing 13 bilÂ-lion years, imÂ-plyÂ-ing in turn that we see them as they were that many years ago.â€œWe are pushÂ-ing our telÂ-eÂ-scopes to the limÂ-it and are tanÂ-taÂ-lizÂ-ingÂ-ly close to getÂ-ting a clear picÂ-ture of the veÂ-ry first colÂ-lecÂ-tions of obÂ-jects,â€• said AlÂ-exÂ-anÂ-der KaÂ-shÂ-linÂ-sÂ-ky of NAÂ-SAâ€™s GodÂ-dard Space Flight CenÂ-ter in GreenÂ-belt, Md. â€œWhatÂ-ever these obÂ-jects are, they are inÂ-tÂ-rinÂ-siÂ-calÂ-ly inÂ-cÂ-redÂ-iÂ-bly bright and very difÂ-ferÂ-ent from anÂ-yÂ-thing in exÂ-isÂ-tÂ-ence toÂ-day,â€• added KaÂ-shÂ-linÂ-sÂ-ky, the lead auÂ-thor of two reÂ-ports on the work to apÂ-pear in AsÂ-tÂ-roÂ-physÂ-iÂ-cal JourÂ-nal LetÂ-ters, a reÂ-search pubÂ-liÂ-caÂ-tion.The obÂ-jects, he argued, are eiÂ-ther the first starsâ€”tiÂ-tanic ones weighÂ-ing more than 1,000 times our sunâ€”or black holes voÂ-raÂ-ciousÂ-ly conÂ-sumÂ-ing gas, a proÂ-cess that would alÂ-so proÂ-duce inÂ-tense light in their area.If theyâ€™re stars, the clusÂ-ters might be the first mini-galaxÂ-ies, weighÂ-ing less than about one milÂ-lion suns, he added; mergÂ-ers of such galaxÂ-ies probÂ-aÂ-bly made bigÂ-ger ones like our Milky Way, which holds the equiÂ-vÂ-aÂ-lent of some 100 bilÂ-lion suns.The earÂ-liÂ-er stuÂ-dy, alÂ-so by KaÂ-shÂ-linÂ-skyâ€™s team, apÂ-peared in the jourÂ-nal NaÂ-ture in NoÂ-vÂ-emÂ-ber 2005.SciÂ-enÂ-tists esÂ-tiÂ-mate that the uniÂ-verse beÂ-gan 13.7 bilÂ-lion years ago in an exÂ-ploÂ-sion, the â€œBig Bang.â€• Stars formed a few hunÂ-dred milÂ-lion years latÂ-er, endÂ-ing the so-called cosÂ-mic dark age. KashÂ-linÂ-skyâ€™s group studÂ-ied the â€œcosÂ-mic inÂ-fraÂ-red backÂ-groundâ€• light, a difÂ-fuse glow that they said comes from this earÂ-ly epÂ-och.

â€œThereâ€™s onÂ-goÂ-ing deÂ-bate about what the first obÂ-jects were and how galaxÂ-ies formed,â€•

said GodÂ-dardâ€™s HarÂ-vey MoseÂ-ley, a co-auÂ-thor of the paÂ-pers. â€œWe are on the right track to figÂ-urÂ-ing this out.â€• If the obÂ-jects are stars, they could be a first genÂ-erÂ-aÂ-tion of stars long sought by asÂ-troÂ-noÂ-mers and termed â€œPopÂ-uÂ-laÂ-tion IIIâ€• stars. Some theÂ-oÂ-rize that their burnt-out remÂ-nants gave rise to the suÂ-perÂ-masÂ-sive black holes, which lurk at the hearts of most galaxÂ-ies. The stars, once spent, would colÂ-lapse inÂ-to smaller â€œseedâ€• black holes, which then swell inÂ-to huge ones by eatÂ-ing up other matÂ-ter nearÂ-by. In orÂ-der to form black holes big enough and fast enough to fit with obÂ-serÂ-vaÂ-tions, these theÂ-oÂ-ries reÂ-ly on the inÂ-iÂ-tial stars themÂ-selves beÂ-ing â€œsuÂ-perÂ-masÂ-sive,â€• weighÂ-ing hunÂ-dreds of suns. Those found in the new stuÂ-dy, if theyâ€™re stars, might fit the bill, reÂ-searchÂ-ers say.â€œThere would be quite a linkâ€• to the black hole theÂ-oÂ-ry, said MarÂ-tin Haehnelt, a cosÂ-molÂ-oÂ-gist with the UniÂ-verÂ-siÂ-ty of CamÂ-bridge, U.K. But he said this would deÂ-pend on KashÂ-linÂ-skyâ€™s team havÂ-ing inÂ-terÂ-preted its reÂ-sults corÂ-rectly, and heâ€™s far from sure of that.ConÂ-tamÂ-iÂ-natÂ-ing light from obÂ-jects in the foreÂ-ground can beÂ-devÂ-il atÂ-tempts to measÂ-ure the â€œinÂ-fraÂ-red backÂ-ground,â€• Haehnelt said. AlÂ-so, he said, KashÂ-linÂ-skyâ€™s stuÂ-dy inÂ-volved comÂ-parÂ-ing sigÂ-nals in difÂ-ferÂ-ent parts of the sky, rathÂ-er than reÂ-solvÂ-ing inÂ-diÂ-vidÂ-uÂ-al obÂ-jects, and itâ€™s hard to say what such corÂ-reÂ-laÂ-tions mean.KashÂ-linÂ-sky said his team careÂ-fulÂ-ly erased light from foreÂ-ground stars and galaxÂ-ies, leavÂ-ing onÂ-ly the most anÂ-cient light; then studÂ-ied flucÂ-tuÂ-aÂ-tions in the brightÂ-ness, reÂ-vealÂ-ing clusÂ-ters of obÂ-jects. â€œImagÂ-ine tryÂ-ing to see fireÂ-works at night from across a crowdÂ-ed city,â€• he said. â€œIf you could turn off the city lights, you might get a glimpse at the fireÂ-works. We have shut down the lights of the uniÂ-verse to see the outÂ-lines of its first fireÂ-works.â€• If theyâ€™re stars, theyâ€™re probÂ-aÂ-bly exÂ-tremeÂ-ly masÂ-sive, MoseÂ-ley said, as small stars shine too inÂ-efÂ-fiÂ-cientÂ-ly to exÂ-plain the light seen; also, there are theÂ-oÂ-retÂ-iÂ-cal reaÂ-sons to beÂ-lieve suÂ-perÂ-masÂ-sive stars would form. A fuÂ-ture telÂ-eÂ-scope planned by NASA, the James Webb Space TelÂ-eÂ-scope, should be able to idenÂ-tiÂ-fy what the clusÂ-ters are, acÂ-cordÂ-ing to memÂ-bers of KashÂ-linÂ-skyâ€™s group.

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