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Recipe for a supermassive black hole - August 25, 2010

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While simulating what happens when two galaxies merge, an astrophysics team cooked up something unexpected: a supermassive black hole forming directly from the collapse of a dense cloud of gas. Their model, presented today in *Nature*, offers a new explanation of how the objects form.

[Lucio Mayer](#) of the Institute for Theoretical Physics, University of Zurich, and his colleagues, found in their numerical simulation that when massive galaxies collide, a giant central gas cloud forms and funnels gas into its centre. Eventually the cloud becomes dense enough for its gravity to be stronger than the outward pressure – at which point it collapses in on itself to form a supermassive black hole with a mass between a million and a billion times that of our Sun.

Co-author [Andrés Escala](#), a theoretical astrophysicist at the University of Chile in Santiago, says there are two main schools of thought on the objects' genesis. One proposes that smaller black holes merge to form a large one; the other, that black holes become supermassive by sucking in vast amounts of gas. The team's results, however, demonstrate a potentially more plausible and direct process.

"In some senses it was a surprise," says Escala, "I had some clues from previous work, but in reality I did not imagine this."

Escala emphasises that their findings do not mean that other previous models are wrong. But, he says, they do rely on the assumption of a particular chemistry in the infant universe. Their model could occur in conditions common in the universe.

There are limitations to this model, however, says Escala. The simulation has some idealisations.

"Reality is much more complex than what we are able to model with current supercomputers," he says, "So the next step is to refine these idealisations and relax the initial conditions to make it more general."

Posted by Rhiannon Smith on August 25, 2010

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