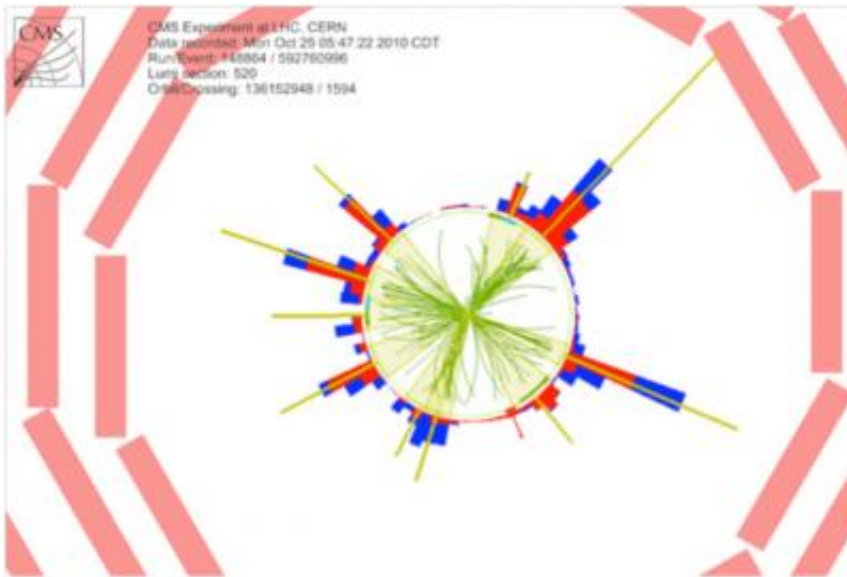


Large Hadron Collider finds no signatures of microscopic black holes

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An example of a CMS event with large total transverse energy ($ST=1.3$ TeV) and high jet multiplicity (10 jets, denoted by yellow cones and lines), as expected from Standard Model processes. Such events are a background to the search for microscopic black holes.

The CMS experiment at CERN's Large Hadron Collider (LHC) has completed a search for microscopic black holes produced in high-energy proton-proton collisions. No evidence for their production was found and their production has been excluded up to a black hole mass of 3.5-4.5 TeV (10^{12} electron volts) in a variety of theoretical models.

Microscopic black holes are predicted to exist in some theoretical models that attempt to unify General Relativity and [Quantum Mechanics](#) by postulating the existence of extra "curled-up" dimensions, in addition to the three familiar spatial dimensions.

At the high energies of the [Large Hadron Collider](#), such theories predict that [particles](#) may collide "closely enough" to be sensitive to these postulated extra dimensions. In such a case, the colliding particles could interact gravitationally with strengths similar to those of the other three fundamental forces – the Electromagnetic, Weak and Strong interactions. The two colliding particles might then form a microscopic black hole.

If it were so produced, a microscopic black hole would evaporate immediately, producing a distinctive spray of sub-atomic particles of normal matter. These would then be observed in the high-precision CMS detector that surrounds the LHC collision point. CMS has searched for such events amongst all the proton-proton collisions recorded during the 2010 LHC running at 7 TeV centre-of-mass energy (3.5 TeV per proton beam).

No experimental evidence for microscopic black holes has been found. This non-observation rules out the existence of microscopic [black holes](#) up to a mass of 3.5–4.5 TeV for a range of [theoretical models](#) that postulate extra dimensions.

The CMS results have been submitted for publication in the *Physics Letters B* journal. CMS will take much more data next year when the LHC resumes running in early 2011 after a brief technical stop.

More information:

-- Search for Microscopic Black Hole Signatures at the Large Hadron Collider, arXiv:1012.3375v1 [hep-ex] arxiv.org/abs/1012.3375

-- [CERN's Scientific Summary](#)

Provided by CERN

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