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Search for Excess Dimuon Production in the Radial Region 1.6<r<10 cm at the D0 Experiment

We report on a study of events containing at least two muons produced in ppbar collisions at sqrt{s}=1.96 TeV, performed at the D0 experiment using data corresponding to 0.9 fb-1 of integrated luminosity collected during 2008. Motivated by a recent claim of an excess in muons produced at large radius by the CDF collaboration, we study muons that appear to be produced with a radius between 1.6 and 10 cm from the initial pbbar collision point. The experimenta signature is a well reconstructed muon that is missing hits in the innermost layer of the tracking detector. We record 28374 muons that appear to be produced without hits in the first layer of the tracking detector. Based on the measured hit efficiency, we epect 27 662 pm 503 pm 1027 muons from the primary interaction to not have a reconstructed hit in this layer. This gives an observed excess of 712 pm 462 pm 942 events in which one or both muons are produced in the range 1.6 < r < 10 cm, which is expressed as a fraction (0.40 pm 0.26 pm0.53)\% of the total dimuon sample. A small level of excess is expected due to cosmic rays, decays-in-flight of pions and kaons, and hadronic punchthrough, and first estimates of these contributions are made. We therefore see no anomalously large excess of muons produced a few centimeters away from the interaction point.

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Track Classification: Beyond the Standard Model