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Identification of charmed particles using multivariate analysis in STAR experiment

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Heavy flavor particles, due to their production at the early stages of a collision, are of interest to study the properties of the matter created in heavy ion collisions at RHIC. Previous measurements of D and B mesons at RHIC[1, 2] using semi-leptonic probes show a suppression similar to that of light quarks, which is in contradiction with theoretical models including only a gluon radiative energy loss mechanism[3]. A direct topological reconstruction is needed to obtain a precise measurement of hadronic charmed meson decays. The remaining combinatorial background can be reduced by using modern multivariate techniques (TMVA)[4] that makes optimal use of all the information available. Comparison with classical methods and recent results[5] as well as the performances of some classifiers will be presented for the reconstruction of D^0 decay vertex ($D^0 \rightarrow K^- \pi^+$) and its charge conjugate from Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV produced in 2007 using the Silicon Vertex Tracker and Silicon Strip Detector.

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[1]Adare A. et al., PHENIX Collaboration, Phys. Rev. C 84, 044905, 2011\newline

[2]B.I. Abelev et al., STAR Collaboration, Phys. Rev. Lett 106, 159902, 2011\newline

[3]Y. L. Dokshitzer, D. E. Kharzeev, Phys. Lett. B 519, 2001\newline

[4]A. Hoecker et al., arXiv:physics/0703039v5\newline

[5]B. I. Abelev, et al, STAR Coll., arXiv:0805.0364\newline

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