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Apples to Apples in Jet Quenching

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Progress in the theoretical understanding of parton branching dynamics that occurs within an expanding QGP relies on detailed and fair comparisons with experimental data for reconstructed jets. Such validation is only meaningful when the computed object, be it analitically or via event generation, accounts for the complexity of experimentally reconstructed jets. The reconstruction of jets in heavy ion collisions involves a, necessarily imperfect, subtraction of the large and fluctuating background: reconstructed jets always include background contamination. The identification of jet quenching effects, that is modifications of the branching dynamics by interaction with QGP leading to changes on jet observables, should be done against a baseline that accounts for possible background contamination on unmodified jets. In practical terms, jet quenching effects are only those not present in samples of vacuum jets that have been embedded in a realistic heavy-ion background and where subtraction has been carried out analogously to that in the heavy ion case and as close as possible to what is done experientally. Using the extensively validated JEWEL event generator, we will present an extensive survey of the sensitivity to background effects of commonly used jet observables. Further, we will assess the robustness of Machine Learning studies aimed at classifying jets according to their degree of modification by the QGP, e.g [1], to a reference where background contamination is accounted for.

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