Abstract for an Invited Paper
for the DNP12 Meeting of
the American Physical Society

Heavy flavours in Pb-Pb collisions at the LHC

FRANCESCO PRINO, INFN Sezione di Torino

In this talk, the heavy flavour measurements performed by the LHC experiments will be reviewed and their role in the characterization of the medium created in these collisions will be discussed. Heavy-flavour hadrons, containing charm and beauty, are powerful probes of the hot and dense medium that is formed in high-energy collisions of heavy nuclei. Charm and beauty quarks are produced in partonic scatterings with high-virtuality occurring in the initial stages of the collision. Afterwards, they traverse the medium, losing energy via gluon radiation and elastic collisions with the partonic constituents. The abundant production of charm and beauty at the LHC enables to measure heavy flavour related observables in Pb-Pb collisions with unprecedented precision. The measurement of the nuclear modification factor of heavy quarks provides a benchmark for the energy loss models that are able to describe the light quark observables. Indeed, radiative energy loss models predict that quarks lose less energy than gluons (that have a larger colour charge) and that the amount of radiated energy decreases with increasing quark mass. Another observable that is sensitive to the interaction of charm and beauty quarks with the medium is the presence of anisotropic patterns in the azimuthal distribution of final state particles. In particular, the second harmonic of the Fourier expansion of the particle azimuthal distribution, called elliptic flow, v_2, has been measured for heavy flavour hadrons at the LHC. At low transverse momenta, a finite v_2 for heavy flavours in non central collisions is expected if charm and beauty quarks suffer re-scatterings in the medium, leading to their thermalization and participation to the collective motion (flow). At higher transverse momenta, a non-zero v_2 is anticipated as a consequence of the path length dependence of energy loss in collisions with non-zero impact parameter.