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Chemical freeze-out in heavy-ion collisions and the quark-hadron phase transition[1] GREGORY KESTIN, ULRICH HEINZ, The Ohio State University — Using the ideal hydrodynamic model we show that in heavy-ion collisions there exists a fundamental difference between "chemical" and "kinetic" freeze-out. This difference is exposed by showing that the "chemical decoupling temperature," found experimentally to have no dependence on impact parameter, cannot be reproduced in simulations using a kinetic decoupling criterion. The "kinetic freeze-out temperature," on the other hand, which is found to have impact parameter dependence, can be described quantitatively using such simulations. We show that kinetic decoupling necessarily leads to impact parameter dependence of the decoupling temperature. Chemical decoupling in heavy-ion collisions must therefore be controlled by a non-kinetic process, such as a phase transition. This supports the interpretation of the measured universal chemical decoupling temperature as the critical temperature for the quark-hadron phase transition.

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