Anisotropic thermal conduction in Galaxy Clusters

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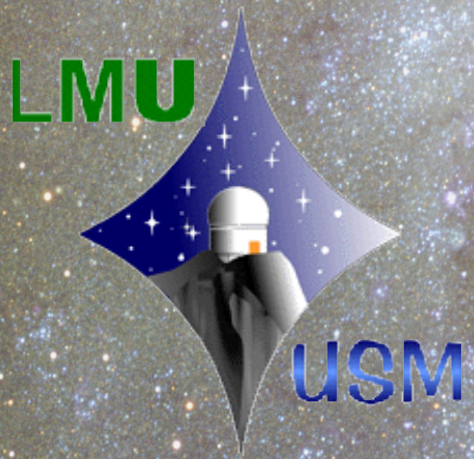

K. Dolag, A. Beck,

M. Petkova, H. Lesch

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Why "anisotropic" conduction?

- Coulomb collisions of charged particles
- Charged particles do not move freely perpendicular to $\vec{B}$

Splitted conduction equation

$$\frac{\partial T}{\partial t} \propto -\nabla \cdot \left[\kappa_{\parallel} \left(\vec{B} \cdot \nabla T \right) \vec{B} + \kappa_{\perp} \left(\nabla T - \left(\vec{B} \cdot \nabla T \right) \vec{B} \right) \right]$$

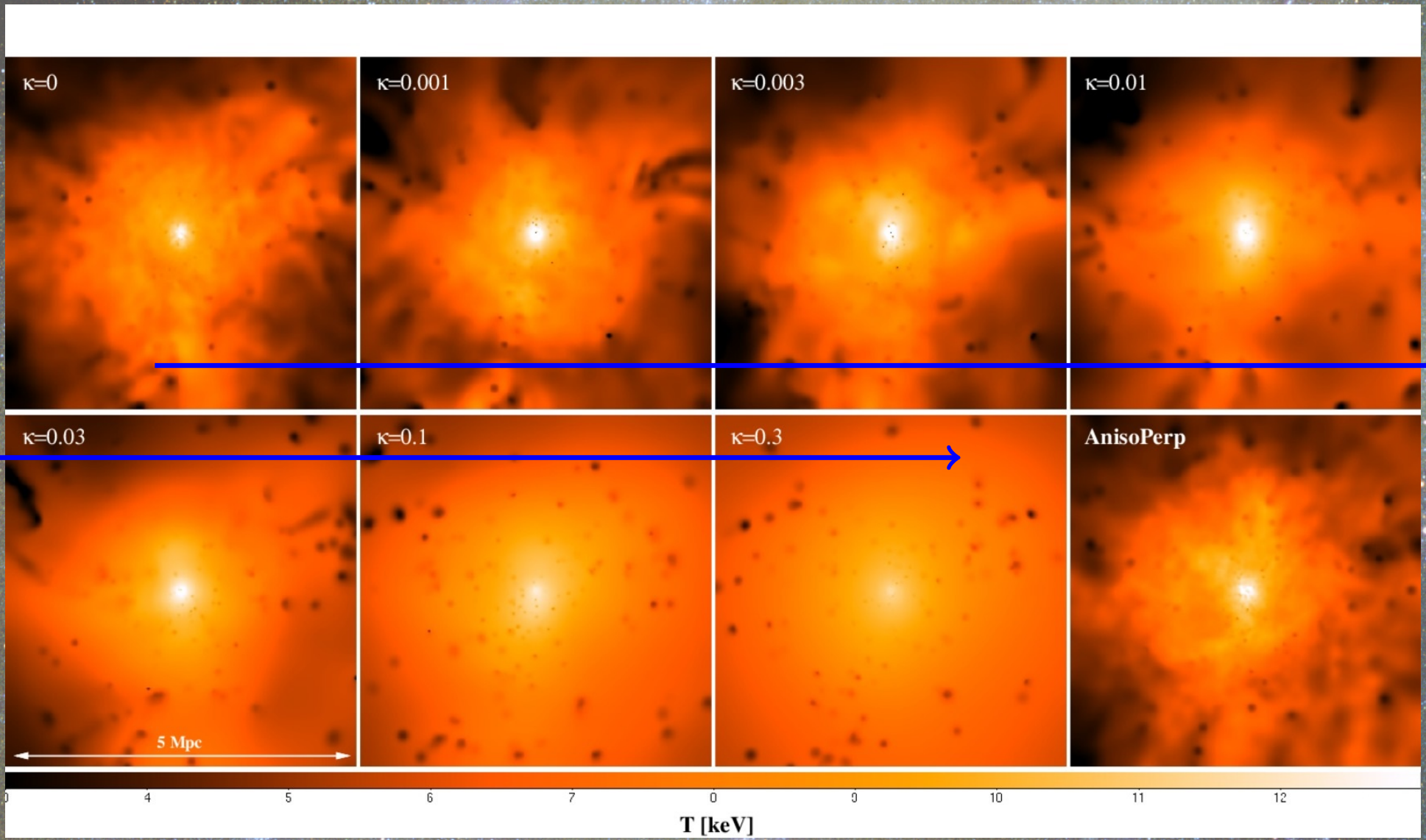
with Spitzer like coefficients $\kappa \propto T^{5/2}$

How are these coefficients related?

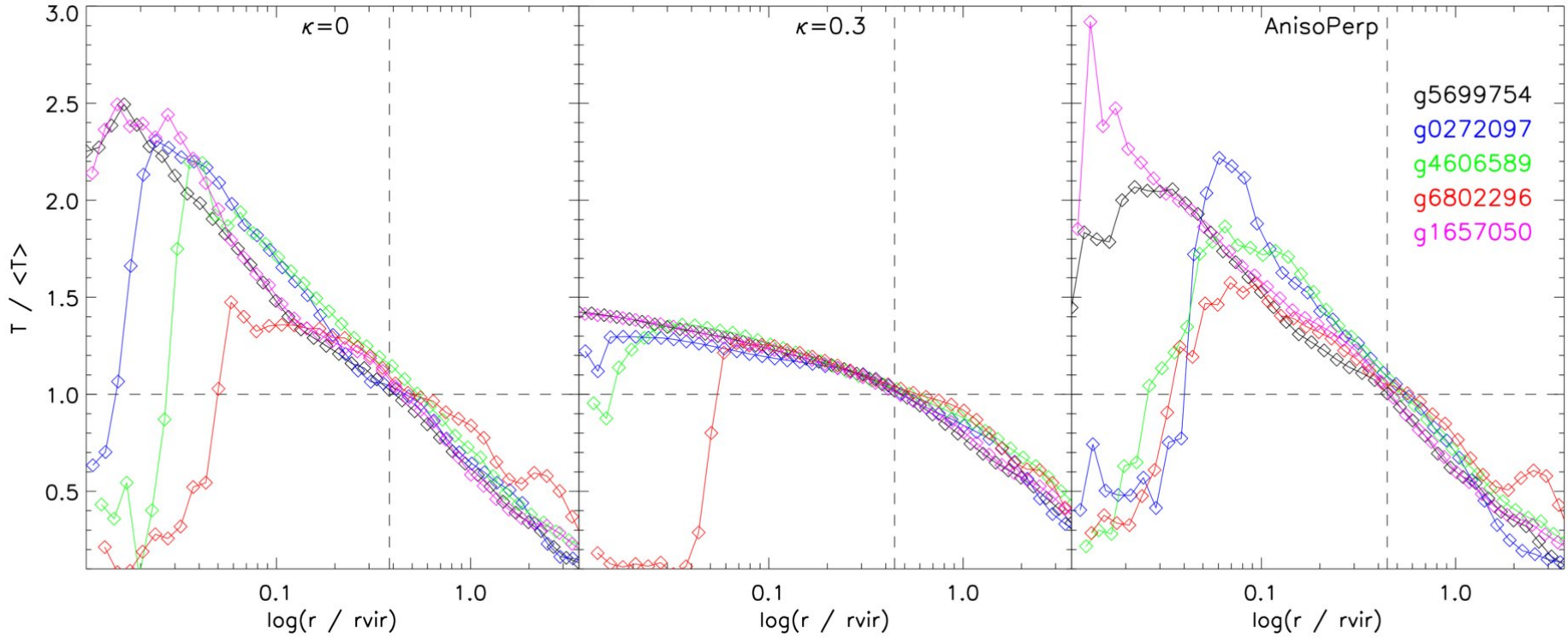
$$\kappa_{\parallel} / \kappa_{\perp} \approx \left[(\omega_g \tau)^{\alpha} + 1 \right]^{-1} \propto B^{-\alpha}$$

with $\alpha = 1$ or 2

Cluster simulations with different efficiency



Radial temperature profiles



Cool Core VS Non-Cool Core

Treatment of perpendicular conduction promotes bimodality

Temperature fluctuations