Derivation principle of BGK models

<u>Abstract:</u> In this talk we will present a derivation principle of BGK models using the resolution of an entropy minimization problem. The construction is based on the introduction of relaxation coefficients and a principle of entropy minimization under constraints for moments. These free parameters are next ajusted to transport coefficients when performing a Chapman-Engskog expansion up to Navier-Stokes. Firstly, the methodology will be explained and illustrated for a monoatomic and polyatomic single gas. Next the case of gas mixtures is considered. In this part, after clarifying the Chapman-Engskog, a BGK model is derived. This BGK model is proved to satisfy Fick and Newton laws. In a last part, we will explain how to extend our model to reacting gas mixtures.