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Atmosphere and evolution of the young Hot Jupiter WASP-10b

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The atmosphere of a planet plays a major role in its evolution. Especially the atmospheres of close-in exoplanets receive a strong irradiation flux from their parent star, in addition to the infrared flux coming from the planet's interior.

We implement the analytic atmosphere model from Guillot 2010 and calculate atmosphere models for the young Hot Jupiter WASP-10b. We connect our atmosphere models with a two-layer interior model consisting of a rocky core and an adiabatic envelope. With these models we perform evolution calculations. The comparison with the measured age of the star WASP-10 allows us to estimate the planet's present intrinsic temperature and to increase the accuracy of the core mass determination. In addition to calculations with constant opacity ratio in the atmosphere, we construct model atmospheres that account for the pressure and temperature dependence of the opacities and investigate how these different atmospheres affect the evolution and derived core mass.

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