

Keck I HIRES Spectral Analysis of the Planetary Nebula NGC 7009

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The strategically important diagnostic lines of, e.g., [O II], [O III] and [S II], secured with the Keck I HIRES, provided us with electron density and temperature information, for the well-known Saturn nebula NGC 7009. We analyzed the spectral line profiles and produced false color maps of velocity dispersion vs. spatial component (long slit direction, $\sim 0.8''$ resolution) with temperature or density information in them. From our investigation of the emission line characteristics, we found that some lines such as those of [O II] and [Ar IV] were mainly due to the UV photoionization, while the [S II] velocity dispersion maps strongly indicated these were perhaps due to shock heating. The [O III] velocity dispersion also showed a velocity field, similar to that of the [S II] result. The [S II] maps also indicated that the emission regions might be consisted of numerous small-scale blobs of about 1 arcsecond, while the [O II] showed no such evidence.