Stellar pulsation and rotation in NGC 6811

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Abstract

We present the results of the frequency analysis for a selected sample of pulsating δ Sct- and γ Dor-type stars in the field of the open cluster NGC 6811, which have been observed in short-cadence (SC) mode by the Kepler satellite. In all cases, the resulting frequency spectra are very complex, especially when the dominant pulsation is that of the δ Sct type, that is, short-period pulsations corresponding to excited pressure (p) modes. In all cases, the δ Sct stars are shown to be essentially δ Sct/γ Dor hybrid pulsators. However, the opposite seems not to be true. We also find that the δ Sct-type peaks commonly are not stable in amplitude. Many of the main peaks significantly change their amplitudes over relatively short time scales. For a large percentage of pulsators in our sample we also find that the variability shown in the light curves is not produced by a single cause, but a combination of various sources: δ Sct- and γ Dor-type pulsations together with rotational modulation produced by starspots in the surfaces of these stars. This is an indication of stellar activity in the surfaces of these relatively hot stars of spectral type A(-F). Sometimes, activity dominates the luminosity variations in various pulsating stars in our sample. Eclipsing binarity is also detected in a few cases. Flares are also detected in one of the δ Sct-type pulsators. This is an indication of unusual strong activity for this kind of hot stars.