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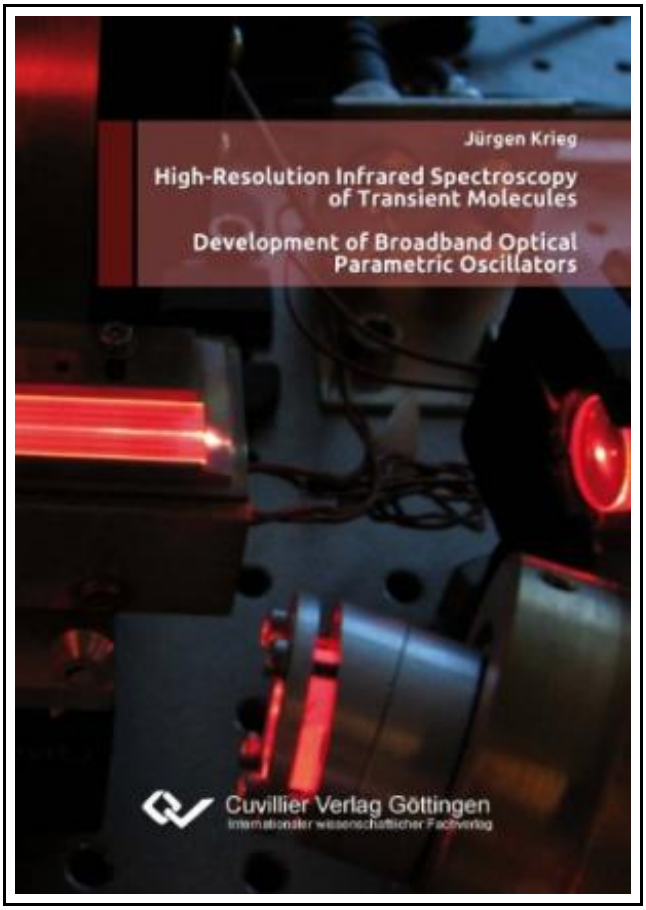

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Reviews

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(Shayne O'Conner)

HIGH-RESOLUTION INFRARED SPECTROSCOPY OF TRANSIENT MOLECULES DEVELOPMENT OF BROADBAND OPTICAL PARAMETRIC OSCILLATORS

Cuvillier Verlag Feb 2012, 2012. Taschenbuch. Book Condition: Neu. 210x149x13 mm. Neuware - The infrared spectral region between wavelengths of 2 and 6 µm is of great importance in molecular physics. Molecules with an X-H bond (X being carbon, nitrogen or oxygen) exhibit strong vibrational transitions there, but also linear carbon clusters Cn (n=2,3,.). Many combination bands and overtones of low-energy vibrational modes also occur in this spectral range. Analyses of these spectral features allow - if highly resolved - for example the prediction of pure rotational transitions in the sub-mm wavelength regime, or help understanding the internal dynamics of the molecule. To provide radiation sources with extremely large frequency coverage, two optical parametric oscillator (OPO) systems in the wavelength regions from 2.5 to 4.1 µm and from 4.7 to 5.4 µm have been set up and characterized in this thesis. The OPO system around 5 µm wavelength is the only one in this spectral region used in high-resolution spectroscopy up to now. Both of the OPO systems have been shown to be ideal tools for spectroscopic studies delivering highly accurate transition frequencies of transient molecules, using the following example cases: The rovibrational spectrum of the fundamental cation CH2D+ around 3.2 µm wavelength has been measured with unprecedented spectral resolution and frequency accuracy. The combination of the OPO as radiation source with a cold ion trap to produce and store the ions has been proven to have a high predictive power for pure rotational transition frequencies of CH2D+. Located at around 100 to 200 GHz, these are of great importance in astrophysics. The V3 fundamental vibration of Si2C3 around 5.1 µm wavelength has been measured using the OPO and a newly built jet spectrometer for the production of transient molecules. Molecular parameters have been determined with high precision. An associated...

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