INTRACAVITY–JET MILLIMETER WAVE SPECTROMETER OROTRON: THE STUDY OF Ne–CO AND CO–H_2

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A new intracavity–jet spectrometer has been built in order to detect in absorption very weak spectra of molecular species, primarily, molecular van der Waals complexes. The unique feature of the developed spectrometer is that the molecular supersonic jet expands directly into the high quality resonator of a tunable coherent radiation source Orotron, which can be continuously tuned in the wavelength range between 2 and 3 mm.[a] The absorption signal is detected by the variation of the electron current in the internal collector circuit of the Orotron. The generator provides a narrow spectral width of the radiation (10–15 kHz) without any phase stabilization, which enables sub–Doppler resolution. The intracavity arrangement results in a long effective absorption path, allowing the gain in sensitivity of more than a factor of 100 in comparison with the existing single pass schemes. The extremely high sensitivity and easy tunability make the spectrometer a very efficient tool for searching new weak absorbing species in the jet. The description of the spectrometer and the analysis of the obtained millimeter wave spectra of the Ne–CO[b] and CO–H_2[c] van der Waals complexes will be presented.

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