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Sommario/riassunto

This book, Volume 4 in the series, is dedicated to the relationship between laboratory spectroscopy, recording ever-more-complex spectra using increasingly powerful instruments benefiting from the latest technology, and the development of observation using instruments that are embedded in mobile probes or nanosatellites. The theoretical models described in Volumes 1, 2 and 3 are used in this volume, applying the cumulant theorem in the mean-field theory framework to interpret the near and mid-infrared spectra of symmetric top molecules, such as ammonia (NH3) and spherical molecules, such as methane (CH4). These molecules can be isolated in their gaseous form or subjected to the environmental constraints of a nano-cage (a substitution site, clathrate, fullerene or zeolite) or surfaces. These methods are not only valuable in the fields of environmental sciences, planetology and astrophysics, but also fit into the framework of data processing and the concept of Big Data.