Preface

With a history of over five thousand years, astronomy is one of the oldest sciences. Our remote ancestors understood the need to measure, understand and exploit the movements of the stars in the sky to develop accurate and reliable clocks and calendars, but they were also certainly fascinated by the beauty, the immensity and complexity of the universe, as we still are today.

The appeal of the majesty of the spectacle that the night sky offers is certainly the primary motivation for most amateur astronomers, and it must also be said that it is the source of many professional astronomers' vocation. But traditionally, while the amateur astronomer's aim is to make a good observation, sometimes requiring a big effort from instruments he often made or improved himself, the professional astronomer rather seeks, through observation, to understand the nature of the stars he/she observes.

It is fascinating for a professional astronomer like me to find that the search for knowledge, this passion that drives me like all my fellow astronomers to discover the laws that govern the behavior of celestial objects, is actually widely shared by the community of amateur astronomers. From the love of beauty to the love of science, is only one step.

The step that François Cochard invites us to take with this beautiful work, is targeted to guide us pleasantly and efficiently down the road of astronomical spectroscopy and its use by amateur astronomers. Spectroscopy consists in decomposing light depending on its wavelength, in a more or less precise way depending on the performance of the instrument used. The application of spectroscopy to astronomy is as old as spectroscopy itself. From the nineteenth century, physicists and astronomical visionaries like Joseph von Fraunhofer, Robert Bunsen and Gustav Kirchhoff in Germany or Jules Janssen and Henri Deslandres at the Observatory of Paris, pointed their spectrographs towards the Sun, discovering the amazing richness of the solar spectrum and began to deduce the composition and characteristics of our day star.

Spectroscopy is a formidable tool which gives us access to a wealth of information from analysis of the light from the objects being observed. It is thus possible to determine the chemical composition of a star, its speed relative to the Earth, its temperature, rotational speed, etc. Thus, by developing and perfecting this amazing tool, astronomers have learned over time to measure

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the speed of distant galaxies and to deduce properties of the expansion of the universe. They have also managed, by measuring with high accuracy the radial velocity of stars through spectroscopy, to detect the tiny movement imparted to these stars by the revolution of planets around them. These are the famous exoplanets which have been the subject of a fruitful twenty-year hunt.

This fantastic tool is now within the reach of amateur astronomers, as shown in this book. Technological advances that first led to the popularization of CCD detectors have now generated a range of spectrographs accessible to all, for all kinds of budgets. And so amateur astronomers can now, in addition to enjoying the beautiful images of heavenly objects, carry out these precise measurements like professional astronomers.

We are at the dawn of a golden age where amateur and professional astronomers will combine their talents and efforts to advance the understanding of the universe. Where professionals develop unique instruments around the world, ultra-sophisticated, mounted on giant telescopes located at the ends of the world or even in space, but which they can only use sparingly, amateurs, armed with their telescopes and spectrographs which are certainly less powerful but much more numerous and versatile, can make their unique contribution.

By coordinating their observations through a dialogue with the professionals, amateurs can contribute to the ongoing research programs by providing valuable data to complement those acquired on major advanced instruments. This may take the form, for example, of systematic monitoring over time of variable stars, or spectroscopic observations of large samples of stars that professionals are struggling to obtain due to the difficulty of access to large instruments.

The book you are about to read is remarkable in the sense that it makes the foundations of astronomical spectroscopy accessible to all and provides practical advice for its application. It will without doubt give you the desire to embark on this great adventure, and provides you the means to achieve it.

> Claude Catala Président de l'Observatoire de Paris