**Empiricism and Scientific Realism in Gersonides’ Astronomical Enterprise**

Levi ben Gershom (Gersonides, 1288–1344), the eminent scientist-philosopher, was unquestionably the most original Jewish astronomer of the Middle Ages. For him, an astronomical theory that enables one to determine the position of the planets at any given time was insufficient. He was a realist who sought to discover the true structure of the universe, aspiring to establish an astronomical theory compatible with natural science and cohering with empirical evidence. Accordingly, he believed that astronomical investigation “can only be undertaken in its perfection by one who is at once a mathematician, a natural scientist, and a philosopher”. Therefore, one should not be surprised to find that Gersonides’ main astronomical work – known as the *Astronomy* – is not a standalone composition, but rather forms an integral part of his great philosophical work, *Milḥamot ha-šem* (*The Wars of the Lord*, book V part 1). Moreover, it is replete with interactions between mathematical astronomy, philosophy, and natural science. The *Astronomy* incorporates innovative astronomical models; criticism directed against many of the most respected scientific authorities of its time; reports on no less than 82 astronomical observations made by Gersonides; and descriptions of observational instruments, some of which were designed by the author himself. Gersonides takes an empiricist stance, which is reflected not only in his reports on actual observations, but also in his recurring and explicit statements on the essential role of sense experience in testing scientific hypotheses. In this regard, the *Astronomy* also deals with meta-science, as it contains discussions on scientific methodologies and reasoning.

The main goal of my project is to examine the exact role of sense experience in Gersonides’ astronomical enterprise, focusing both on how Gersonides collected empirical data, and the ways he used this data for testing his predecessors’ astronomical theories and developing his own original theoretical models. The project will be carried out in several stages. The first will be devoted to the production of an initial transcription of Gersonides’ *Astronomy*. Although the text has received considerable scholarly attention in recent years, only some of its 136 chapters have been published, as the *Astronomy* was omitted from all printed editions of *Milḥamot ha-šem* (probably due to its mathematical character and its length: it fills more than 250 folios in the extant manuscripts). Already during the production of the transcription, I will identify the places in which Gersonides refers to the importance of empirical investigation, reports on his own observations, or uses empirical data for formulating his astronomical theory.

The second stage will be devoted to investigating the methods and techniques Gersonides used for collecting empirical data. Gersonides was well aware of the many difficulties one faces in collecting data through experience. For instance, he argues that “an error in manufacture [of an instrument] causes an error in observation taken with it”, and emphasizes the need to invent a new instrument in which “errors would arise neither in its construction, nor in its observations”. In this stage, I will thus focus on Gersonides’ reports on the astronomical observations he carried out, and on his usage of different astronomical instruments, such as the *camera obscura* and the Jacob’s staff. I will aim to clarify: What were Gersonides’ exact needs in constructing his observational instruments? How did he design his instruments and how did he assess their accuracy? What motivated him to carry out observations of his own? And what were the criteria for selecting one observational instrument over the others in different cases? At this stage, I will also turn to an additional text written by Gersonides, *Ḥug šamayim* (Circuit of Heavens), a treatise on an armillary sphere of Gersonides’ own design, which has not yet received serious scholarly attention and is still in manuscript form.

According to Gersonides, “experience is the point of departure for inquiry, not inquiry the point of departure for experience”. Therefore, only after studying the ways Gersonides collected empirical data, I will turn to examine the ways he used this data for formulating his innovative astronomical models. Through this analysis, I intend to uncover Gersonides’ methodological principles in science, and the role of sense experience in his thought and practice. Did the empirical data collected by Gersonides play a crucial part in the formation of his astronomical theory? Or, perhaps, did he only use this data for tuning his models and supporting his pre-existing ideas? How did he respond to observations which did not fit with his theories? Did he indeed implement his principle that “if we find in it [i.e., in experience] something that is incompatible with reason, we should not reject experience”? Can we find any indications regarding observations Gersonides carried out which he did not report on in his writings? While Gersonides’ astronomical project will be at the heart of this study, I also intend to deal with other instances in which Gersonides discusses the role of sense experience or uses empirical data throughout his entire oeuvre, including in the philosophical sections of *Milḥamot ha-šem*, his biblical commentaries, *Ḥug šamayim*, and his supercommentaries on Averroes.