

Bertrand, Guy**Le Verrier's calculations for the discovery of Neptune. (Les calculs de Le Verrier pour la découverte de Neptune.)** (French) [Zbl 08136154](#)[Gaz. Math., Soc. Math. Fr. 186, 18-43 \(2025\).](#)

This historical and disciplinary article examines the work of Urbain Jean-Joseph Le Verrier on the prediction and subsequent discovery of Neptune, focusing in particular on his reconstruction of the anomalous motion of Uranus.

Already recognized among his peers for his willingness to engage with technically demanding problems, Le Verrier was entrusted in 1845 with one of the major unresolved questions of mid-nineteenth-century astronomy: accounting for persistent discrepancies between Uranus's observed positions and its predicted ephemerides. After roughly a year of intensive calculations, he proposed the existence and approximate location of an unknown planet responsible for these perturbations. A visual search conducted at the Berlin Observatory on 23 September 1846 confirmed his prediction within about one degree of his computed position.

The author draws on several primary sources: three communications presented by Le Verrier to the Académie des sciences between November 1845 and August 1846; a 254-page memoir published shortly after the discovery; and, most importantly, his unpublished manuscripts housed at the Paris Observatory. These handwritten materials – approximately 1,300 pages across seven notebooks – are not digitized and must be consulted on site. The article, adapted from a doctoral dissertation defended in 2023, offers a detailed analysis of both the organization and the mathematical substance of these documents.

Using Le Verrier's 279 observational data points for Uranus, the author reconstructs the successive stages of reasoning that led to the prediction of the perturbing planet's position. Rather than merely summarizing the procedure, the article carefully contextualizes each step, explaining the underlying assumptions, approximations, and methodological choices. Facsimiles of selected manuscript pages are provided, accompanied by precise commentary that illuminates Le Verrier's working methods.

Particular emphasis is placed on Le Verrier's computational virtuosity. The author conveys the sheer scale of the calculations completed in little more than a year, as well as the remarkable precision achieved. Le Verrier's manuscripts reveal an intense concern for numerical accuracy: they contain extensive marginal notes explaining intermediate results, justifying strategic decisions, and documenting systematic cross-checks. These annotations form a central object of analysis.

The article also briefly addresses the controversies that followed the visual discovery, while keeping its main focus on the technical process itself. Finally, attention is given to the assistance Le Verrier may have received, notably from his student Émile Gautier, a collaboration that appears to have remained largely unacknowledged for many years.

Reviewer: Frédéric Morneau-Guérin (Québec)

MSC:[01A55](#) History of mathematics in the 19th century**Keywords:**[Astronomy](#)