

Huygens and Optics

Saturn and the origin of waves

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Projet du Contenu de la Dioptrique

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**Plan for a publication containing
Huygens' dioptrics:**

- theory of lenses and telescopes

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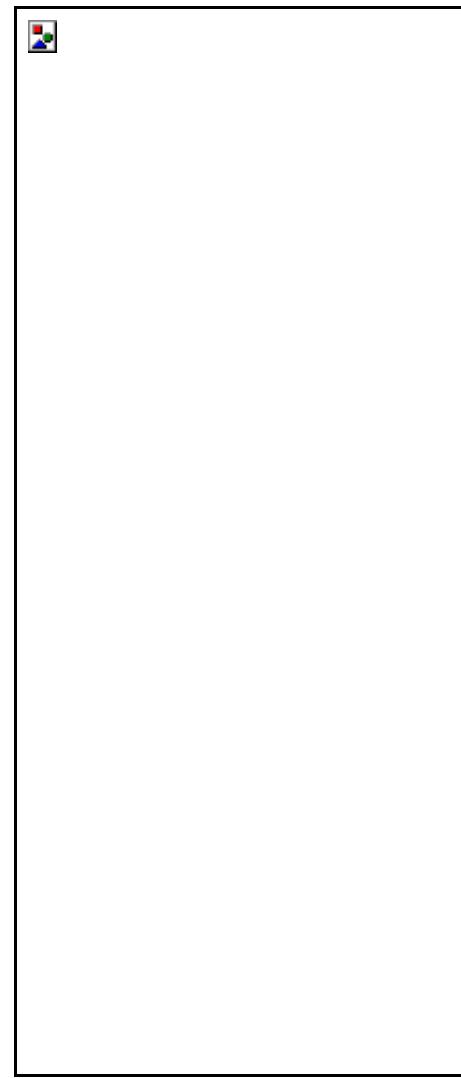
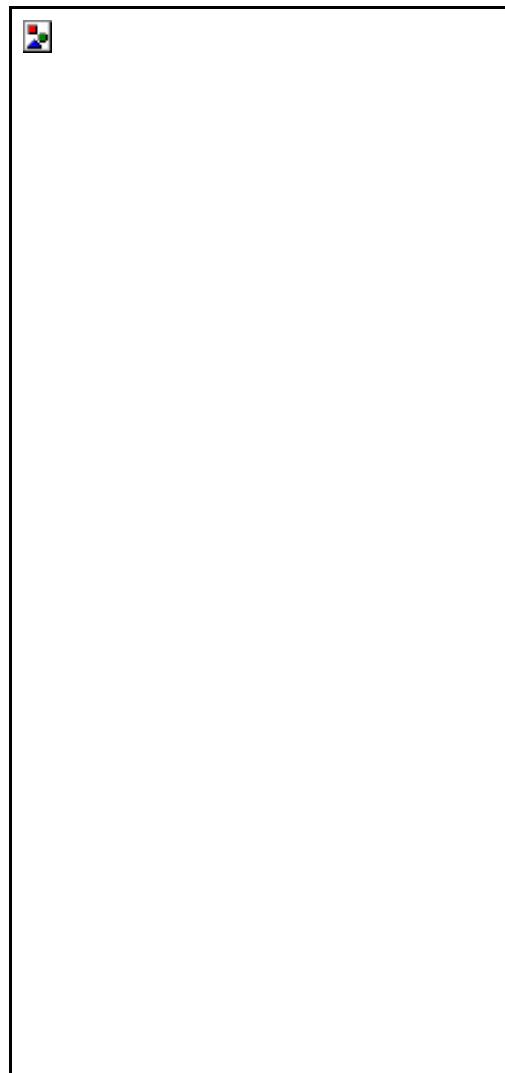
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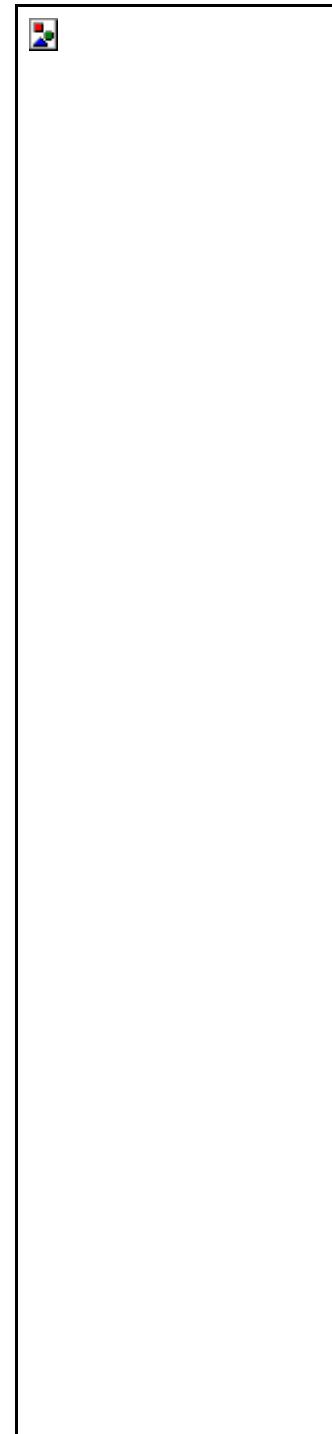
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Focal distances



Focal distances



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**Plan for a publication containing
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- theory of lenses and telescopes
- plus introduction
 - history of telescope
 - explanation of sine law

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Strange refraction in Iceland Crystal

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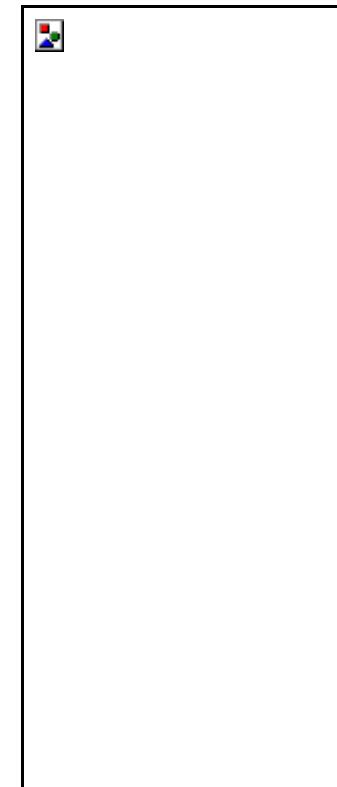
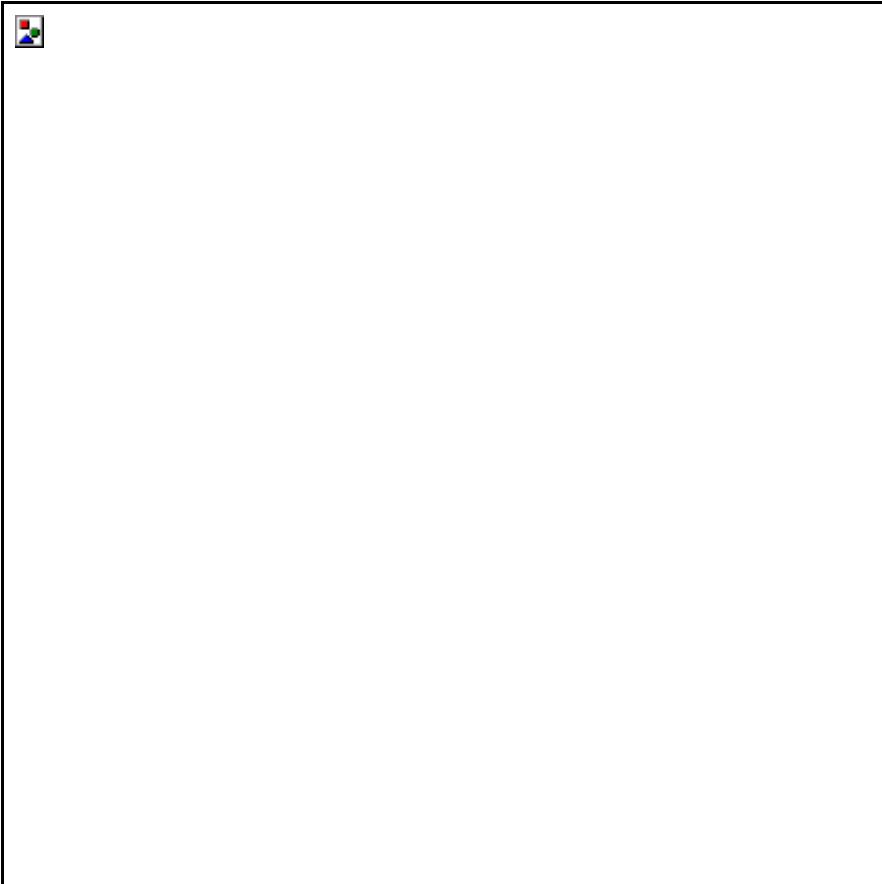
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Strange refraction in Iceland Crystal

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How can the perpendicular ray become oblique by the refraction, for it happens that the waves will not be at right angles to the line of their extension or emanation, contrary to what our hypothesis of light demands.

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Comment le rayon perpendiculaire peut il devenir oblique par la refraction, car il arrivera que les ondes ne seront pas a angles droits a la ligne de leur extension ou emanation, contre ce que demande notre hypothese de la lumiere.



Spherical aberration

**the aberration of the
planoconvex lens is
cancelled out by the
aberration of the
bi-concave lens**



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Spherical aberration

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Newton renders the 1669 design useless

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*Lens composita aquipollis,
Hyperbolicae,
Aug. 10.*

1672 feb. 1669.


*Hoc inservit
strobilura
propriæ Aberratio,
num Naturam
nâ græ colorum
inducere.*

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Spherical aberration

the aberration δ is found by multiplying the thickness q of the lens by the expression below which only involved the radii of curvature of the anterior (a) and posterior (n) face of the lens.

$$\frac{7n^2 + 6an + 27a^2}{6(a + n)^2}$$

the aberration is minimal when $a:n = 1:6$



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**Plan for a publication containing
Huygens' dioptrics:**

- theory of lenses and telescopes
 - excluding spherical aberration
- plus introduction
 - history of telescope
 - explanation of sine law

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a theory of the telescope

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Applying the sine law to derive, in exact fashion, the focal distances of spherical lenses as they are employed in actual telescopes, instead of the hypothetical lenses derived by Descartes

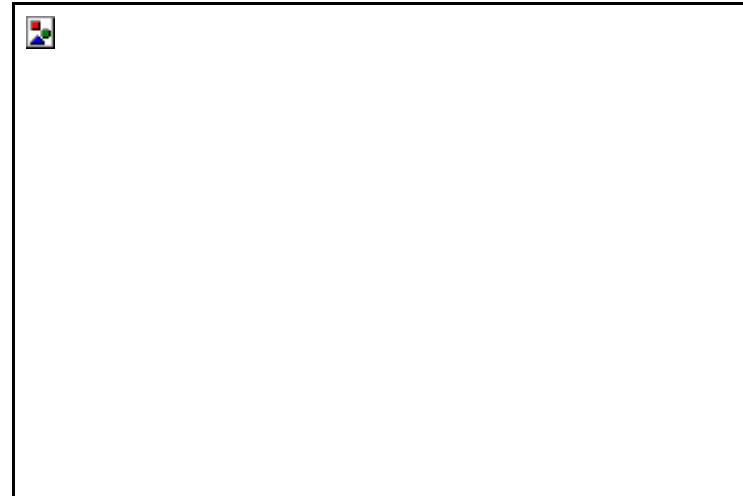
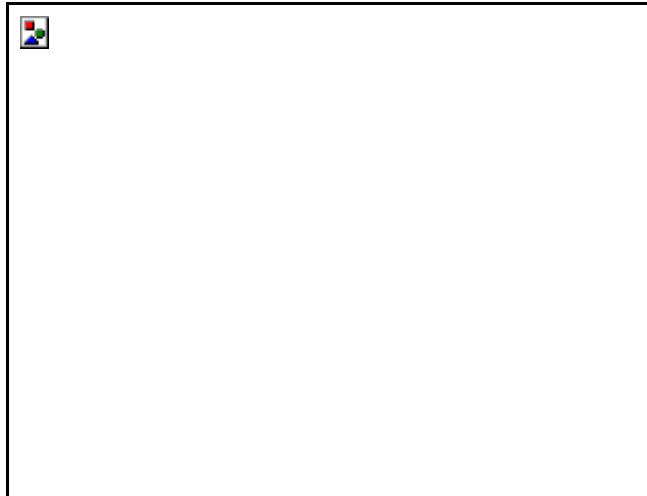


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Systema Saturnium

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**Practical dioptics
Innovations on telescopes**

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Spherical aberration

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**Mathematical analysis of lenses
aimed at *improving* the telescope**

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Huygens' dioptrics

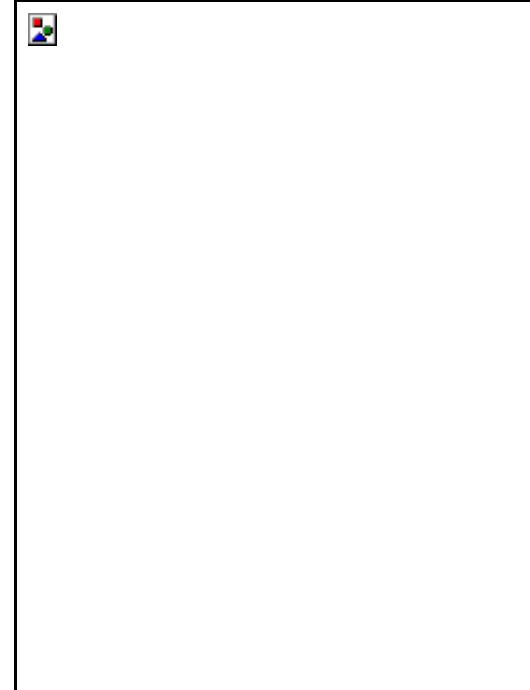
- 1653 theory of the telescope
- no 1665 theory of spherical aberration
- plus introduction
 - history of telescope
 - explanation of sine law
 - strange refraction

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Huygens' principle and the solution to the 'difficulté' of Iceland crystal

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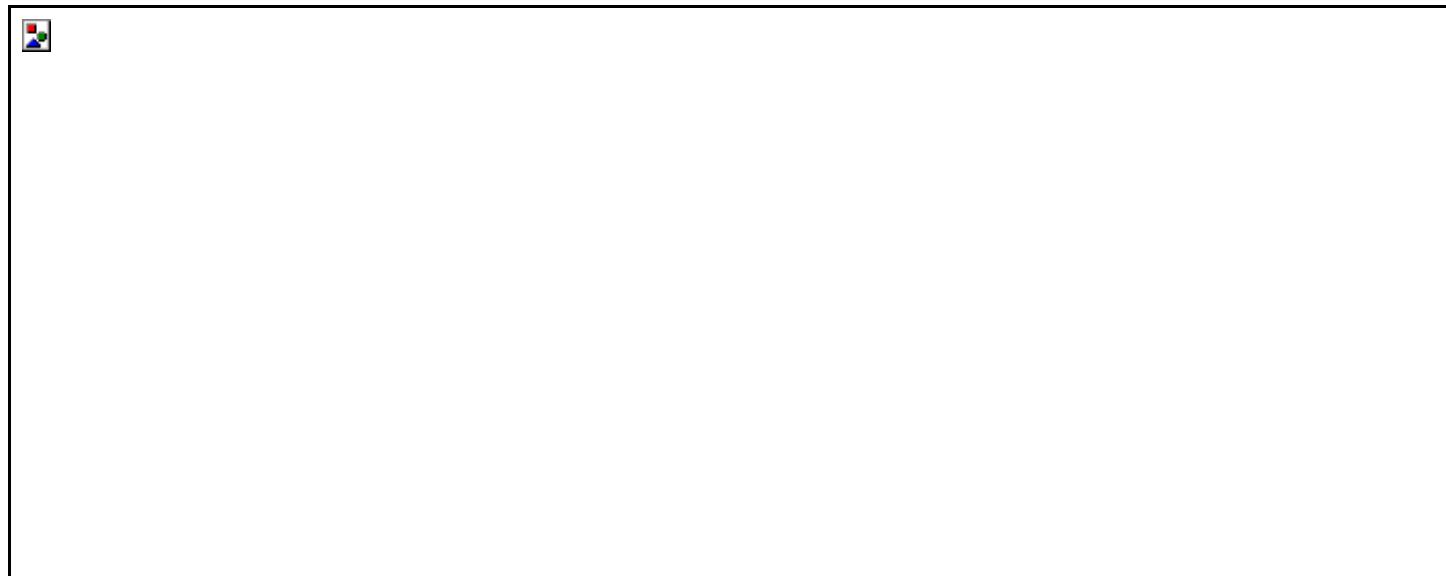
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Traité de la Lumière



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A treatise on the physics of light

- wave theory
- dissected from dioptrics
- in French





Lenzen slijpen

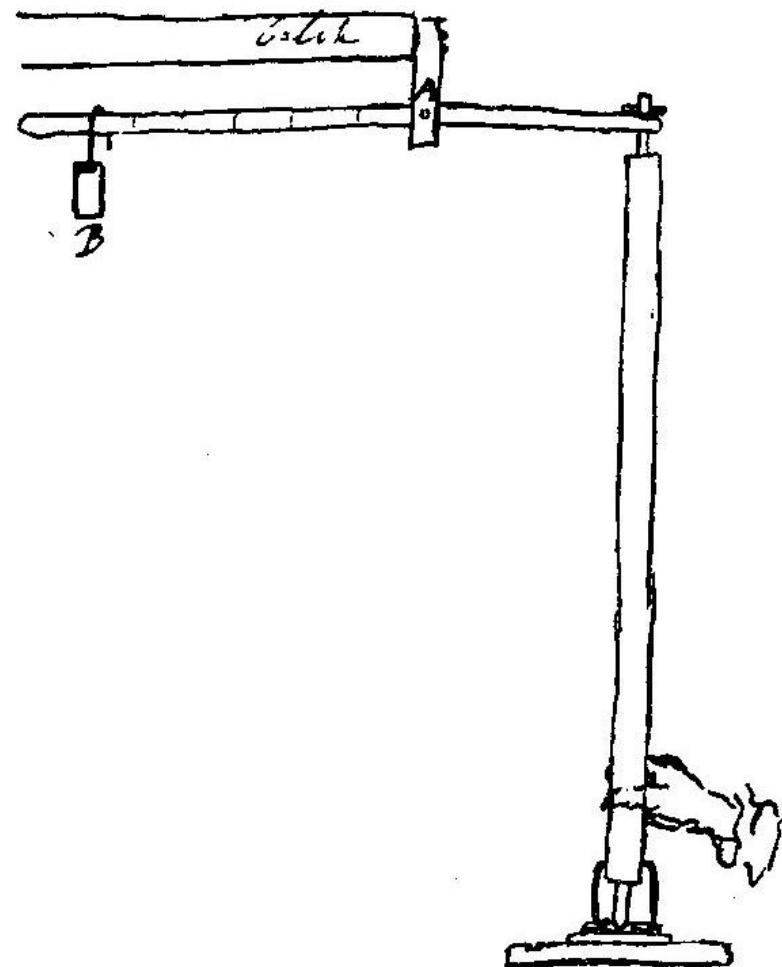


Foto lens , telescoop





