Variability vs. Substantiality

Kurd Lasswitz and his Influence on Marburg Neo-Kantianism

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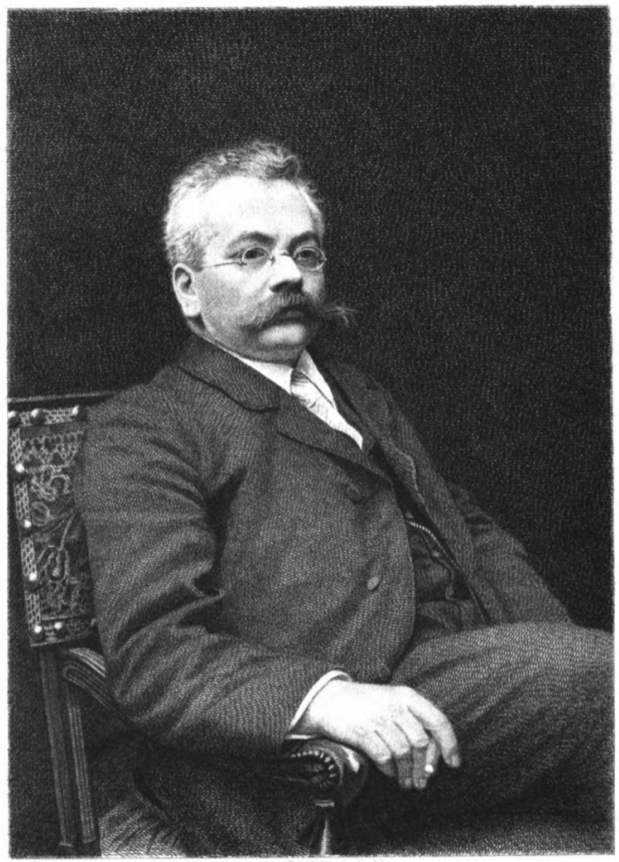
New Perspectives on Neokantianism and the Sciences (Ruhr Universität Bochum, March 14–17, 2022)

UNIVERSITÀ
DEGLI STUDI
DI TORINO

Introduction



Kurd, Laßwitz

(*20-4-1848, Breslau – †17-10-1910, Gotha)

- physicist
- philosopher
- historian of science
- writer

Introduction

IV. *Ueber Tropfen an festen Körpern insbesondere an Cylindern; von Dr. Kurd Lafswitz in Breslau.*

I.

Differentialgleichung und Volumen von Tropfen.

Die von Laplace[1]), Gaufs[2]) und Poisson[3]) aufgebaute mathematische Theorie der Capillarität ist, zumeist von Poisson selbst, zur Auflösung einer grofsen Anzahl von Aufgaben über das Gleichgewicht von Flüssigkeiten und festen Körpern benutzt worden und hat im Allgemeinen eine aufserordentliche Uebereinstimmung der Rechnung mit der Erfahrung ergeben[4]). Aus diesem Grunde soll, obwohl die physikalischen Hypothesen Poissons der modernen Anschauung kaum genügen können, die Anwendung jener Theorie im Nachstehenden auf einen weiteren Specialfall ausgedehnt werden, wobei es vorläufig dahingestellt bleiben mufs, ob das Experiment auch hier die Theorie bestätigt. Das unbekannte Gesetz der Molekular-Wirkung tritt nur in Form von Constanten in die resultirenden Gleichungen, welche doch erst *a posteriori* bestimmt werden können. Die Berechtigung der Untersuchung beruht auf dem wohl zweifellosen Satze, dafs die Wirkung des Capillardrucks senkrecht ist zur Oberfläche und proportional der Summe der reciproken Krümmungsradien der Hauptschnitte, $\frac{1}{R_1} + \frac{1}{R_2}$, ein Ausdruck, wel-

1) *Sur l'action capillaire, Supplément au X livre du traité de mécanique céleste*; und *Supplément à la théorie de l'action capillaire.* Beide Abhandlungen in *traité de mécanique céleste, T. IV.*

2) *Principia generalia theoriae fluidorum in statu aequilibrii.*

3) *Nouvelle théorie de l'action capillaire.* Paris 1831. Vergleiche ferner: *Paul du Bois-Reymond „De aequilibrio fluidorum"*, Dissertatio inaug. Berol. 1859.

4) Ausgedehnte Beobachtungen rühren her von Gay-Lussac, Desains, Bède, Brunner, Hagen, Frankenheim, Quincke u. A.

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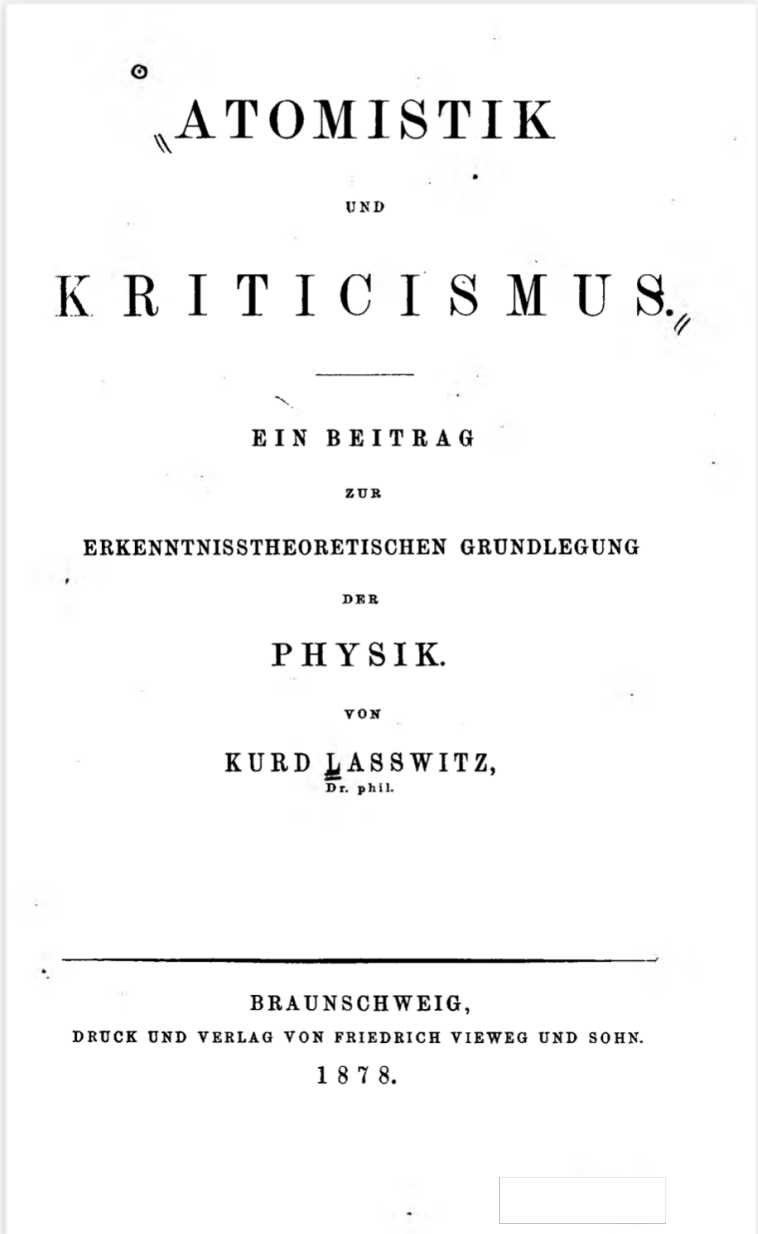

ATOMISTIK

UND

KRITICISMUS.

EIN BEITRAG

ZUR

ERKENNTNISSTHEORETISCHEN GRUNDLEGUNG

DER

PHYSIK.

VON

KURD LASSWITZ,

Dr. phil.

BRAUNSCHWEIG,

DRUCK UND VERLAG VON FRIEDRICH VIEWEG UND SOHN.

1878.

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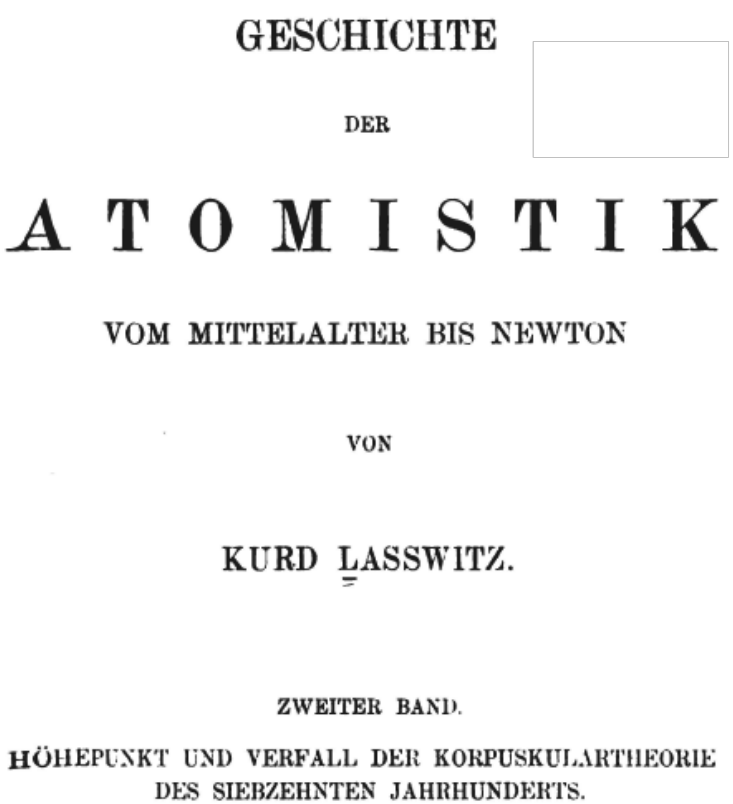
GESCHICHTE

DER

ATOMISTIK

VOM MITTELALTER BIS NEWTON

VON

KURD LASSWITZ.

ZWEITER BAND.

HÖHEPUNKT UND VERFALL DER KORPUSKULARTHEORIE
DES SIEBZEHNTEN JAHRHUNDERTS.

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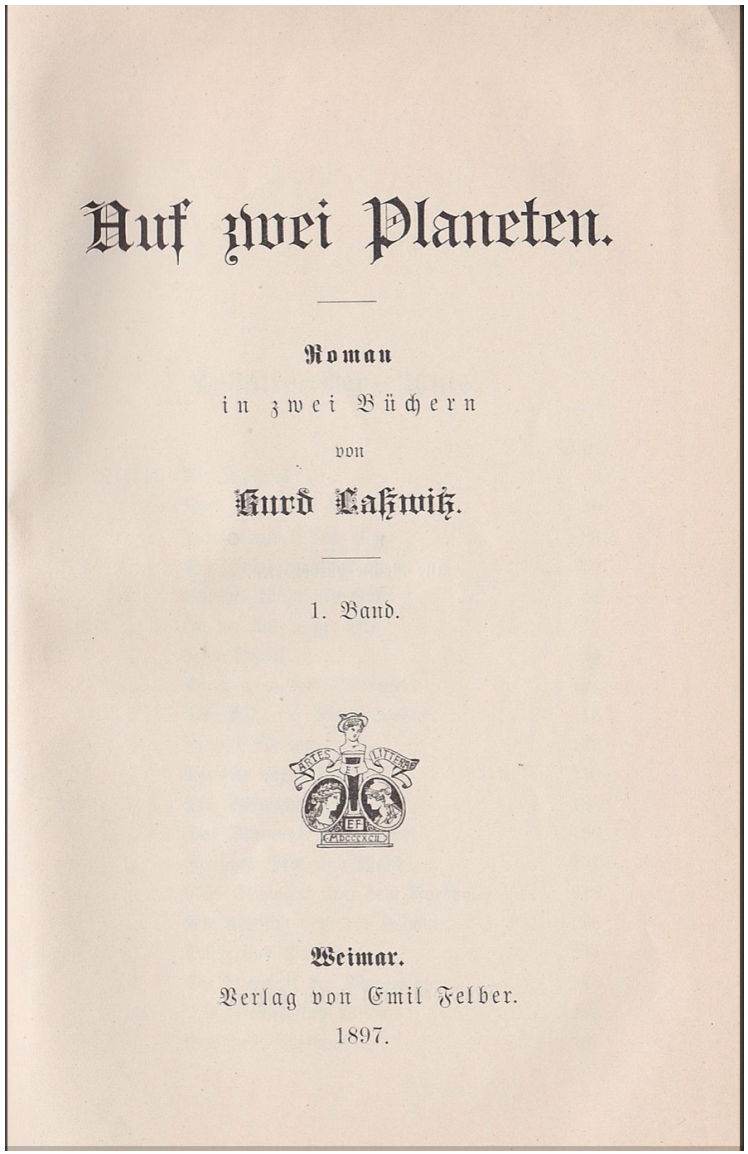

Auf zwei Planeten.

Roman

in zwei Büchern

von

Kurd Laßwitz.

1. Band.

Weimar.

Verlag von Emil Felber.

1897.

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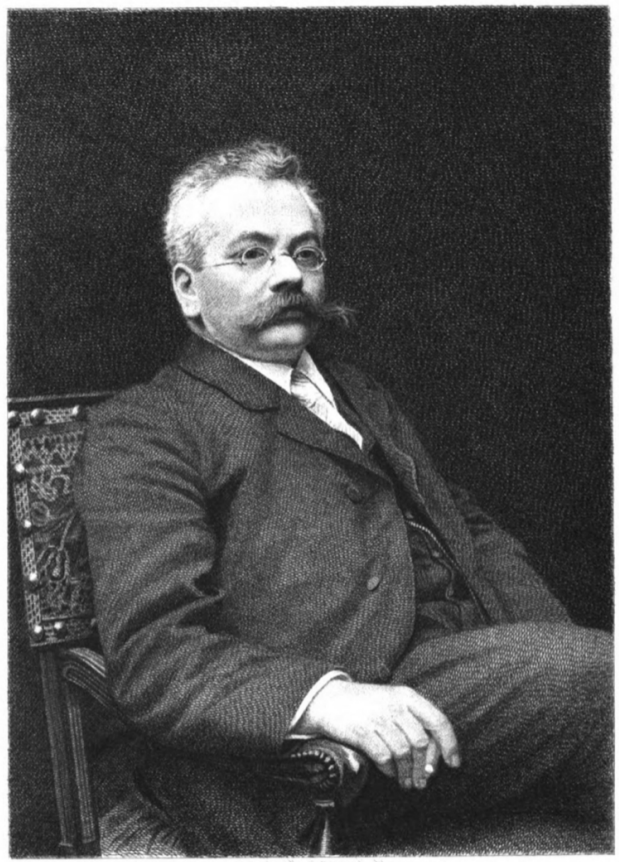

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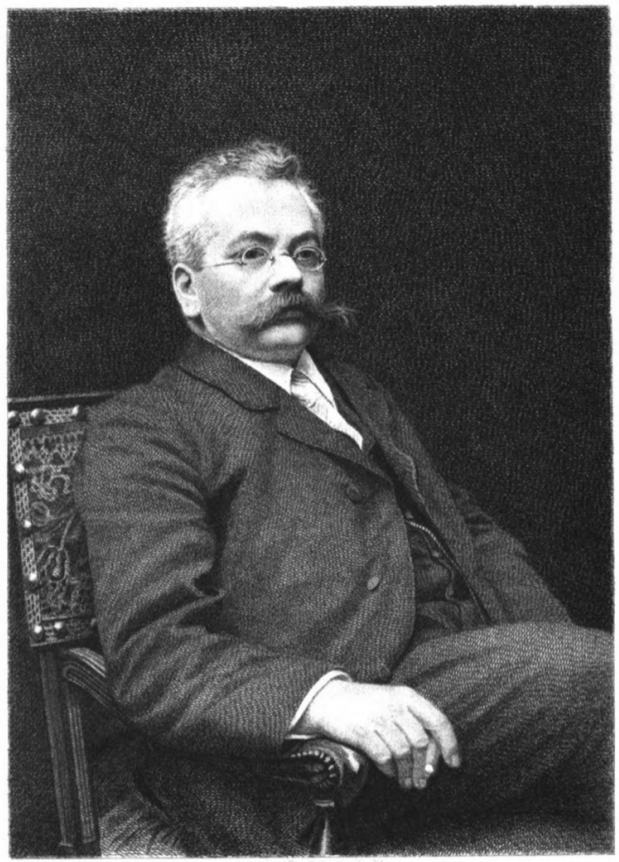

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Lasswitz and the Marburg School (ca. 1885–1895)

- Lasswitz as non-resident member of the Marburg school
- Lasswitz as the most successful neo-Kantian historian of science

Introduction

PART 1: Lasswitz, Cohen and the ‘Cohen Circle’

PART 2: The Articulation of Lasswitz’s Philosophy: Variability vs. Substantiality

PART 3: Lasswitz’s History of Atomism: Huygens and the Foundation of Kinetic Atomism

PART 4: Lasswitz and Marburg School: The Case of Cassirer

Part I

Lasswitz, Cohen and the ‘Cohen Circle’

Das Princip

der

Infinitesimal-Methode

und seine Geschichte.

Ein Kapitel zur Grundlegung der Erkenntnisskritik.

Von

Dr Hermann Cohen
ordentlichem Professor der Philosophie
an der Universität Marburg.

Berlin
Ferd. Dümmlers Verlagsbuchhandlung
Harrwitz und Gossmann
1883.

the ‘differential’ dx as ‘intensive magnitude’, or ‘intensive reality’

Lasswitz’s correspondence with **Georg Cantor** about Cohen’s book (spring and winter 1884)

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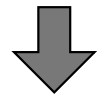

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Lasswitz's Positive Review of Cohen's Book

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Das Nachstehende bietet keine Kritik des Cohen'schen Buches im Sinne einer ausreichend begründeten Bekämpfung der anzuzweifelnden Punkte, sondern einen thatsächlichen Bericht über die vom Verfasser in seinem Werke niedergelegte Gedankenreihe. Vielleicht könnte man einen solchen für überflüssig halten gegenüber einer Schrift, welche jetzt vermutlich schon von Jedem gelesen ist, der sich mit dem Studium erkenntnistheoretischer Fragen beschäftigt. Berücksichtigt man jedoch die Fülle tiefsinniger Untersuchungen und grundlegender Gedanken, welche in den engen Raum von 111 Paragraphen zusammengedrängt sind, dabei die Schwierigkeit des Stoffes und die das Verständnis nicht erleichternde Schreibweise, so wird eine Rekapitulation des Inhalts dieser wichtigen Schrift möglicherweise auch dem Kenner derselben willkommen sein; giebt doch Cohen hier die Quintessenz des von ihm vertretenen „erkenntniskritischen Idealismus".

Die Aufgabe der Erkenntniskritik ist nach Cohen mit dem Worte „Erkenntnistheorie" nicht sicher genug bezeichnet; dieses nämlich erweckt die Vorstellung, als handle es sich um die theoretische Untersuchung desjenigen psychischen Vorgangs, der beim Erkennen stattfindet. Man würde aber sehr irren, wenn man meinte, durch eine psychologische Zergliederung unseres Erkenntnisapparates die Bedingungen der Erkenntnis aufzufinden; man würde dadurch nur das Bewusstsein selbst beschreiben, indem man seine Elemente angäbe; damit aber bliebe man innerhalb der hypothetischen Aufstellung von Sätzen über die Art

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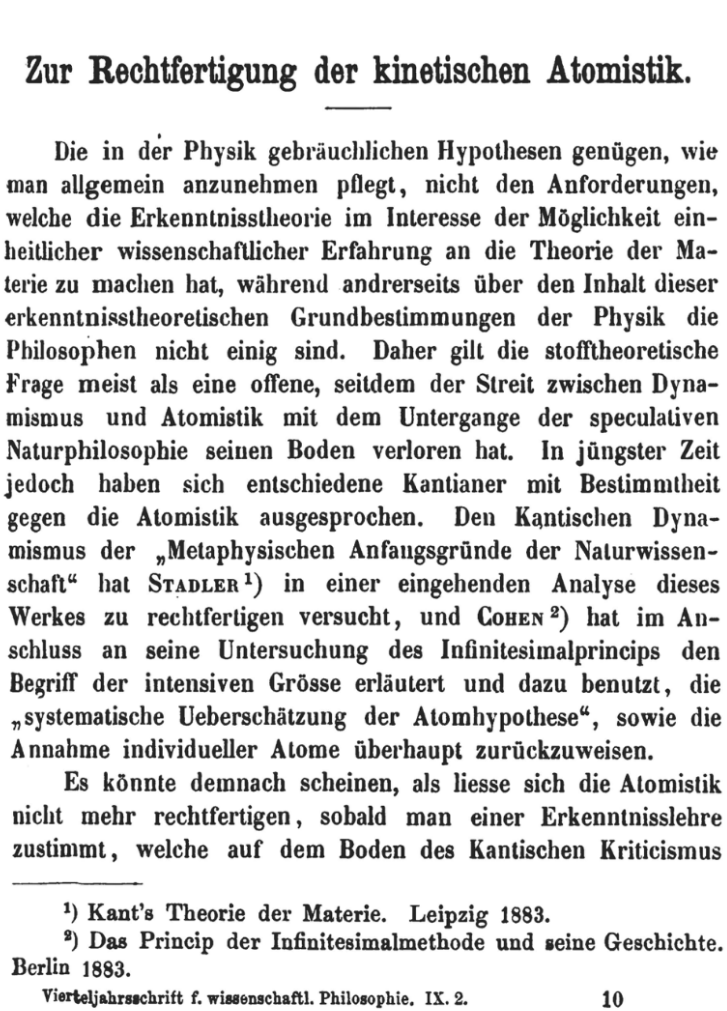
Lasswitz's *Ausseiderseztung* with Cohen



Zur Rechtfertigung der kinetischen Atomistik.

Die in der Physik gebräuchlichen Hypothesen genügen, wie man allgemein anzunehmen pflegt, nicht den Anforderungen, welche die Erkenntnisstheorie im Interesse der Möglichkeit einheitlicher wissenschaftlicher Erfahrung an die Theorie der Materie zu machen hat, während andrerseits über den Inhalt dieser erkenntnisstheoretischen Grundbestimmungen der Physik die Philosophen nicht einig sind. Daher gilt die stofftheoretische Frage meist als eine offene, seitdem der Streit zwischen Dynamismus und Atomistik mit dem Untergange der speculativen Naturphilosophie seinen Boden verloren hat. In jüngster Zeit jedoch haben sich entschiedene Kantianer mit Bestimmtheit gegen die Atomistik ausgesprochen. Den Kantischen Dynamismus der „Metaphysischen Anfangsgründe der Naturwissenschaft" hat Stadler[1]) in einer eingehenden Analyse dieses Werkes zu rechtfertigen versucht, und Cohen[2]) hat im Anschluss an seine Untersuchung des Infinitesimalprincips den Begriff der intensiven Grösse erläutert und dazu benutzt, die „systematische Ueberschätzung der Atomhypothese", sowie die Annahme individueller Atome überhaupt zurückzuweisen.

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[1]) Kant's Theorie der Materie. Leipzig 1883.
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> Cohen, following his investigation of the infinitesimal principle clarified the concept of intensive magnitude and used it to reject the 'systematic overestimation of the atomic hypothesis' and the assumption of individual atoms altogether.

Lasswitz 1886, 138

Cohen's Achievement

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dynamical conception of motion

- kinematic notion of motion: change of position in time (extensive magnitude);
- dynamic conception of motion: the *Wirkungsfähigkeit* of a body in motion defined in the instance (intensive magnitude)

differential

Cohen’s Achievement

> “[T]here is a difference between the bodies in motion and those at rest, a reality of motion [*Realität der Bewegung*] which the elimination of time cannot abolish [. . .] [I]t consists in the dynamic effectiveness [*Wirkungsfähigkeit*] of the bodies. Cohen has convincingly demonstrated that the latter can be expressed by the category of reality in connection with the principle of intensive magnitude. I welcome this insight.[. . .] This intensive magnitude that is objectified by the thought-instrument [*Denkmittel*] of reality is what I understood by the sensation of impetus [*Andrangsempfindung*] as ‘the real of the motion’ [*dem Realen der Bewegung*], and I recognize Cohen’s expression as the more adequate term for what I imperfectly called sensation of impetus [*Andrangsempfindung*]”

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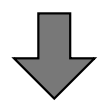
dynamical theory of matter
(Boscovich, Kant)

- geometrical notion of matter:
  an extended volume
  (extensive magnitude)
- physical notion of matter:
  each unextended point
  possesses a tendency towards
  extension (intensive
  magnitude)



center of force

Cohen's Mistake

- in a completely **homogeneous matter** without any quality the recognition of the same part of space is as impossible as that of the same point in homogeneous space.
- in order to serve as the subject of motion the **same place** must be recognized at any moment in the course of its history

impenetrability and rigidity $\Longrightarrow$ separate individuals (atomism)

Cohen's Mistake

> It is the question of how it is possible for parts of space to act as a whole, the question of the individualization of matter. This problem cannot be solved by the concept of intensive reality, but only through that of the substance [. . .] But as soon as the substance appears as a principle or means of individuation of matter, we have atomism [. . .] Atoms should mean nothing but those parts of space which are moved as individual wholes fixed by the concept of substance. This shows that the concept of the differential does not exhaust the thought-instruments of natural science, but that the concept of the atom also belongs to them. The differential is used to describe motion, but the moving object, as soon as it appears as an independent whole, requires the concept of the atom

Lasswitz 1885, 144

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> It is the question of how it is possible for parts of space to act as a whole, the question of the individualization of matter. This problem cannot be solved by the concept of intensive reality, but only through that of the substance [. . .] But as soon as the substance appears as a principle or means of individuation of matter, we have atomism [. . .] Atoms should mean nothing but those parts of space which are moved as individual wholes fixed by the concept of substance. This shows that the concept of the differential does not exhaust the thought-instruments of natural science, but that the concept of the atom also belongs to them. The differential is used to describe motion, but the moving object, as soon as it appears as an independent whole, requires the concept of the atom

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Lasswitz 1885, 144

Early Reactions to Lasswitz's Work in Marburg

- Elsas to Lasswitz, 07-01-1887: "... in particular I have confirmed with my scientific friends Cohen and Natorp that you are revealing more and more **a line of thought related to ours**"
- Natorp to Lasswitz, 24-09-86: "... my sincere joy at having come into contact with you through this business correspondence; this connection would now also result **in something beneficial for the cause**"

Zum Problem der Continuität.

I.

Allgemeine Bemerkungen.

Aus dem wechselvollen Inhalt des Bewusstseins, welcher das Gesammterlebniss der Menschheit ausmacht, wird im Laufe der Culturentwicklung ein Theil als gesetzmässig erkennbar ausgeschieden. Räumlich und zeitlich bestimmte Gruppen von Empfindungen kehren regelmässig wieder, Wandel der Tages- und Jahreszeiten, Auf- und Niedergang der Gestirne, Blühen und Reifen der Früchte, Gewohnheiten der Thiere, Vorgänge des eigenen Organismus. Soweit in derartigen Erscheinungen Gesetzmässigkeit erkennbar wird, soweit entsteht eine neue Art der Existenz; an Stelle passiven Erwartens, unbestimmten Erlebens, triebartigen Handelns tritt bewusstes Ueberlegen; es giebt etwas Erkennbares. Diese Erkennbarkeit ist das psychologische Zeichen derjenigen Art des Seins, welche wir objective Wirklichkeit nennen. Das Nicht-Erkennbare bleibt immer subjective Vermuthung, Gegenstand des Fürchtens und Glaubens, Gebiet des Mythos. Dies schliesst nicht aus, dass gerade der Schwerpunkt des Lebens in diesen Gebieten liegt, in der subjectiven Gewalt der Gefühle. Aber das ist eine andere Art des Wirklichen. Objective Wirklichkeit nennen wir den Complex räumlich-zeitlicher Empfindungen, welcher einer gesetzlichen Bestimmbarkeit unterliegt[1]). Diese objective Wirklichkeit ist nichts Starres, Unveränderliches, Transcendentes. Sie ist vielmehr abhängig von dem Culturzustande der Menschheit, von dem Fortschritt der Erkenntniss; sie ist nichts anderes, als der Inhalt dieses Fortschrittes; und auch sie hat ihre Grade.

Von den ersten empirischen Regeln über Ereignisse der Natur bis zur Systematik mathematischer Naturwissenschaft

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1) Vgl. auch Natorp, über objective und subjective Begründung der Erkenntniss. Philos. Monatshefte XXIII p. 274.

Denkmittel

Denkmittel (thought-instruments) — *Grundsätze* (Principles)

Denkmittel of **substantiality**: properties define the identity of a thing with respect to different things

Denkmittel of **causality**: one thing determines the change of properties of other things

Denkmittel of **variability** (17th century)

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Denkmittel

> The category of reality is thus contained in what we have called the *Denkmittel* of variability, something that is a unitary element in itself but has a tendency to change. [. . .] Without the *Denkmittel* of variability, the flying arrow would rest at every point of its trajectory; [this *Denkmittel*] permits the abstraction of extension without eliminating the tendency. [. . .] [The latter is denoted mathematically by] by a differential, and the sign dy should be suitable for this, because according to mathematical school usage, dx means the differential of the independent variable, dy that of the function [$dy = f'(x)dx$] The connection between the principle of intensive magnitude and the category of reality with the infinitesimal method only becomes clear through the reference to the concept of function.

Lasswitz 1888, 203

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Lasswitz 1888, 203

Urbanization of the Cohenian Province

Galilei and Gassendi

Galilei's Theorie der Materie.

(Erster Artikel.)[1]

I. Die intensive Realität im Zeitmoment.

Das wissenschaftliche Naturerkennen beruht auf der gesetzlichen Darstellung dessen, was als Wechsel der sinnlichen Empfindungen gegeben ist. Die psychologische Wirklichkeit dieses Empfindungswechsels verliert ihren subjectiven Charakter und wird zur objectiven, erkennbaren Natur, soweit es dem Denken gelingt, denselben durch Begriffe, denen allein Allgemeingiltigkeit zukommt, zu beherrschen. Daher zeigt sich in der Culturgeschichte der Fortschritt der Naturwissenschaft gebunden an die Entwickelung der Denkmittel, welche zur gesetzlichen Fixirung von Wahrnehmungen tauglich sind. Als eine wesentliche Eigenschaft des Wahrnehmungsinhalts finden wir aber seine Veränderlichkeit. Deshalb hängt die Aufgabe, Empfindungen zu objectiviren, d. h. durch Begriffe zu definiren und in gesetzlichen Zusammenhang zu bringen, an dem Problem, die Veränderung, den Wechsel zweier Zustände, den wir thatsächlich fortwährend erleben, begrifflich so zu fassen, dass er Gegenstand des Denkens, der allgemeingiltigen Vergleichbarkeit und Mit-

[1] Da redactionelle Rücksichten eine Theilung des Artikels nothwendig machten, erlaubt sich der Verf. zu bemerken, dass der vorliegende erste Theil nur die unentbehrliche Einleitung zur Darstellung der Theorie der Materie bildet, welche bei Galilei auf dem Begriffe der intensiven Realität im Raumelement beruht. Es muss auf diesen zweiten Theil auch schon darum hier verwiesen werden, weil derselbe einzelne Literaturangaben enthält, welche man im vorliegenden Theile vermissen könnte.

Galilei: *Denkmittel* of variability, but no *Denkmittel* of substantiality

- dynamical theory of motion (intensive reality in time)
  - $\Longrightarrow$ *momento*
  - $\Longrightarrow$ differential
- dynamical theory of matter (intensive reality in space)
  - $\Longrightarrow$ non-extended parts
  - $\Longrightarrow$ center of forces

Galilei and Gassendi

Galilei's Theorie der Materie.

(Zweiter Artikel. Schluss.)

II. Die intensive Realität im Raumelement.

Wenn Galilei erklärte, dass die Philosophie im Buche des Universums in mathematischer Sprache geschrieben stehe[1]), so hatte er den Schlüssel zu dieser Sprache in dem mathematischen Ausdrucke für die Bewegung entdeckt. In der intensiven Erfüllung des Zeitmoments war eine Realität des Naturgeschehens gegeben, von welcher die Erkenntniss desselben ausgehen konnte. Aber so nothwendig das Denkmittel der Variabilität, auf welchem die neue Entdeckung beruhte, für den Fortschritt der Naturwissenschaft war, so machte es doch das Denkmittel der Substanzialität nicht entbehrlich. Die intensive Erfüllung des Zeitpunktes liess die Veränderung begreifen, aber diese Veränderung ist zugleich ein räumlicher Vorgang, und das Denken erfordert, auch im Raume Einheiten zu construiren, welche das Subject der Bewegung sind. Die neue Wissenschaft der Mechanik löste das Problem der Bewegung, aber die Physik birgt noch ein zweites Problem, das der Raumerfüllung. Auch dieses hat Galilei in Angriff genommen. Seine Discorsi handeln von zwei neuen Wissenschaften; diese zweite — in den ersten „Tagen" behandelt — beschäftigt sich mit dem Widerstande und der Festigkeit der Körper, und hierbei verfährt Galilei in analoger Weise wie in der Mechanik. Wie er die Bewegung zu begreifen lehrt durch Abstraction von der Ausdehnung in

[1]) Il Saggiatore, Op. II, p. 247. (Padua 1744.)

Galilei: *Denkmittel* of variability, but no *Denkmittel* of substantiality

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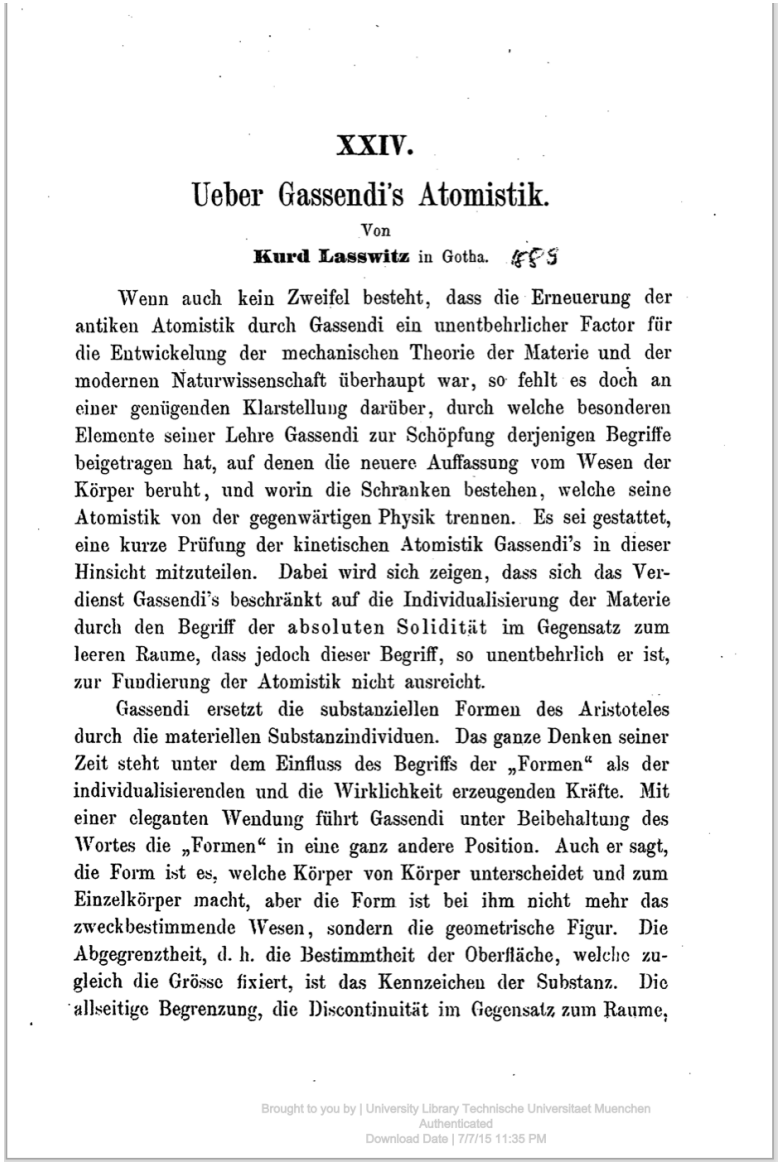
Galilei and Gassendi



XXIV.

Ueber Gassendi's Atomistik.

Von

Kurd Lasswitz in Gotha.

Wenn auch kein Zweifel besteht, dass die Erneuerung der antiken Atomistik durch Gassendi ein unentbehrlicher Factor für die Entwickelung der mechanischen Theorie der Materie und der modernen Naturwissenschaft überhaupt war, so fehlt es doch an einer genügenden Klarstellung darüber, durch welche besonderen Elemente seiner Lehre Gassendi zur Schöpfung derjenigen Begriffe beigetragen hat, auf denen die neuere Auffassung vom Wesen der Körper beruht, und worin die Schranken bestehen, welche seine Atomistik von der gegenwärtigen Physik trennen. Es sei gestattet, eine kurze Prüfung der kinetischen Atomistik Gassendi's in dieser Hinsicht mitzuteilen. Dabei wird sich zeigen, dass sich das Verdienst Gassendi's beschränkt auf die Individualisierung der Materie durch den Begriff der absoluten Solidität im Gegensatz zum leeren Raume, dass jedoch dieser Begriff, so unentbehrlich er ist, zur Fundierung der Atomistik nicht ausreicht.

Gassendi ersetzt die substanziellen Formen des Aristoteles durch die materiellen Substanzindividuen. Das ganze Denken seiner Zeit steht unter dem Einfluss des Begriffs der „Formen" als der individualisierenden und die Wirklichkeit erzeugenden Kräfte. Mit einer eleganten Wendung führt Gassendi unter Beibehaltung des Wortes die „Formen" in eine ganz andere Position. Auch er sagt, die Form ist es, welche Körper von Körper unterscheidet und zum Einzelkörper macht, aber die Form ist bei ihm nicht mehr das zweckbestimmende Wesen, sondern die geometrische Figur. Die Abgegrenztheit, d. h. die Bestimmtheit der Oberfläche, welche zugleich die Grösse fixiert, ist das Kennzeichen der Substanz. Die allseitige Begrenzung, die Discontinuität im Gegensatz zum Raume,

Gassendi: *Denkmittel* of substantiality, but no *Denkmittel* of variability

- solidity of atoms as the condition of their individuality
- no way to understand the exchange of velocity

Part III

Lasswitz's History of Atomism: Huygens and the Foundation of Kinetic Atomism

GESCHICHTE

DER

ATOMISTIK

VOM MITTELALTER BIS NEWTON

VON

KURD LASSWITZ.

ZWEITER BAND.

HÖHEPUNKT UND VERFALL DER KORPUSKULARTHEORIE
DES SIEBZEHNTEN JAHRHUNDERTS.

HAMBURG UND LEIPZIG,
VERLAG VON LEOPOLD VOSS.
1890.

Huygens as The High Point of Kinetic Atomism

- *Denkmittel* of variability: Galilei defined physical **Wirkungsfähingkeit** of a body in motion (free fall)
- *Denkmittel* of substantiality: Gassendi the **individuality** of the subject of motion (impenetrable and rigid)

> The *Denkmittel* of variability does not apply only to the change of the velocity of a single body [free fall], but to the distribution of velocities in a group of bodies. Huygens accomplished the implementation of the Galilean thought by applying the same principle of a lawful change in velocity to the distribution of velocities from a part of space to another

Lasswitz 1890, 378

Huygens as The High Point of Kinetic Atomism

- atoms act upon one another by **collision**: collision means nothing but that the motion of two atoms after their encounter is determined **univocally** by their motion before
- if the masses of the atoms before and after the collision are unchanged, the velocities and their directions after the collision are determined by the **laws of conservation** of mv and mv^2.

Abbildung aus Huyghens, De percussione.

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> Huygens' assumptions are therefore equivalent to these two principles of mechanics, the law of the conservation of the center of gravity and of the conservation of energy. [. . .] What is essential and decisive for Huygens is that he did not start from any ideas taken from the senses or anthropomorphically colored, but from mechanical facts, which he regarded as fundamental laws because they are necessary and sufficient to determine the motion of the bodies unequivocally [*eindeutig*], to calculate their velocities and directions of bodies, if those before the collision are given. It is not because bodies are elastic that their *vis viva* is conserved after the impact; but because living force must be conserved, the impact occurs in the way observed in bodies which we call elastic. [T]he elastic displaceability of the parts [. . .] is not a condition of the laws of collision. Huygens does not call the bodies he is dealing with elastic but hard; and this does not mean a sensuous quality, but the Gassendian notion of solidity, the property of substance to unchangeably claim its own space [*Ihren Raum unveränderlich zu behaupten*]

Lasswitz 1890, 369

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Newton and Leibniz

- **objection:** Huygens' collisions are impossible because a momentary jump in velocity takes place (Leibniz, Boscovich)

elasticity of atoms

> "Accordingly, we have seen how the transition to the dynamic theory in Leibniz is shaped in such a way that the place of the concept of substance shifts, in that the tendency towards motion is turned into a substance instead of corporeal extension. Because such a substance is not found in the extension, it is placed behind the extension. And this is why we see Leibniz, like Newton, hypostathized the cause of motion, not in the physical world, but in an otherworldly metaphysical power."
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> *Lasswitz 1891, 481*

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Transcendental Deduction as Hypothetical Deduction

Huygens' kinetic atomism is the **condition** and the **ideal** of a physical theory

> It is perhaps not superfluous, in order to avoid misunderstandings, to point out repeatedly that the transcendental conditions of experience and their historically evolving knowledge are two different things. Critical philosophy must never presume to want to determine *a priori* the conditions of experience and the principles of physics, but it can only do this in the historical process; and as physical knowledge changes, so too will the doctrine as to what the content of the transcendental conditions of experience historically change The essential difference between the transcendental principles and the change in theories. Not how the principles of scientific knowledge are formulated in the consciousness of mankind at a given epoch, but that they must be formulated
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> *Lasswitz 1891, 393*

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Part IV

Lasswitz and Marburg School: The Case of Cassirer

Lasswitz and the Marburg School

- Natorp (review and correspondence) (1891) $\Longrightarrow$ quantity and quality
- Cohen (correspondence and response) (1891–1894) $\Longrightarrow$ origin
- Cassirer (long-life indirect dialogue) (1902–1936) $\Longrightarrow$ substance and function

Lasswitz and the Marburg School

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LEIBNIZ' SYSTEM

in seinen wissenschaftlichen Grundlagen.

Von

Dr. Ernst Cassirer.

Marburg.
N. G. Elwert'sche Verlagsbuchhandlung.
1902.

Lasswitz and the Marburg School

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SUBSTANZBEGRIFF UND
FUNKTIONSBEGRIFF

Untersuchungen über die Grundfragen
der Erkenntniskritik

von

ERNST CASSIRER

VERLAG VON BRUNO CASSIRER
BERLIN 1910

Lasswitz and the late Cassirer

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Conclusion

Lasswitz

- **variability** and **substantiality** $\Longrightarrow$ example of a successful philosophical dialog with Marburg neo-Kantianism
- **condition** and **ideal** $\Longrightarrow$ example of neo-Kantian historiography of science

Thanks!

Marco Giovanelli

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Appendix

> One recognizes, however, that this application of the thought-instrument [*Denkmittel*] of variability to the spatial element cannot achieve what it is supposed to achieve; it has its power in fixing the dynamic motion in the time element, but is not able to turn the space element into matter [. . .] Kinetic atomism therefore sees the original reality of both the filling of space and the change in position of the parts of space not in the character of the individual points in space, but in the character of the motion of entire parts of space The predicate of joint motion of the parts of a space quantum can be attributed to it by the thought-instrument of substantiality In this way an individual mass particle arises; if the tendency to move laid as an expansive force in the individual points in space, it would be impossible to understand how a sum of such points could have a common motion

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> Solidity is the expression for the property of the parts of space, through which they are space-claiming [*raumbehauptende*] individuals Not because the atoms are hard, they cannot be separated, but the inseparable, absolutely solid is the condition [. . .] of real being in general, which is linked to the substance But the difficulty arises [. . .] to get the interaction of atoms. [. . .] However, one overlooks the fundamental difference [. . .] that separates modern from ancient atomism The former is based on the concept of energy distribution, the latter is only based on the distribution of substance in space, or, expressed in epistemological terms, the former has the *Denkmittel* of variability at its disposal, the latter only that of substantiality

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> Science has the task of explaining how things come about, i.e. to teach them to understand their existence from their becoming. This problem must be maintained in the strictest sense. In the system of physics, however, becoming is determined more closely to motion, and thus motion becomes the basis of cognition of bodies in their existence and in their change. Of course, there must also be a relative existence and preservation. [...] Such preservation is not the identity of a thing, of a single finite body, but of a relationship that hovers immaterially over the individual moments of motion, uniting and connecting them all through a common bond. [...]. A straight path leads from Faraday's force centers to Thompson's vortex atoms and modern electron theory.

Buek 1912

Appendix

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Cassirer 1929

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