

# PP Gruppe 8

January 28, 2014

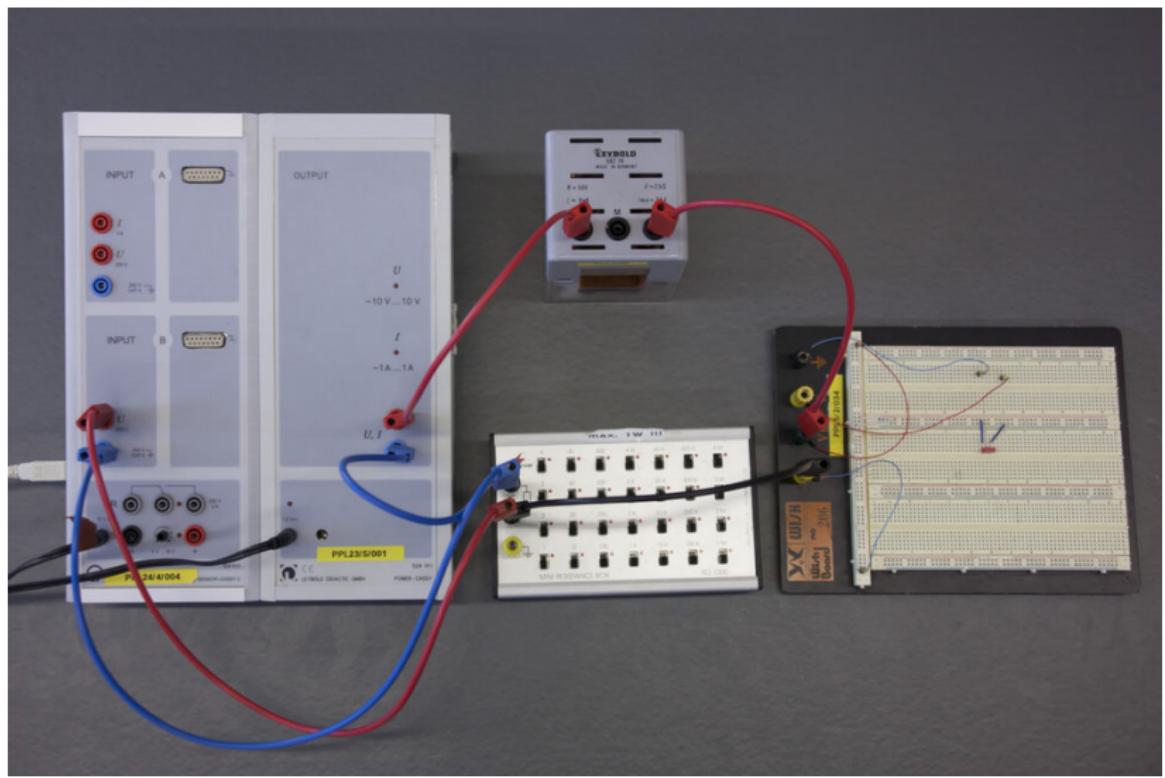
## 1 Frequenzfilter

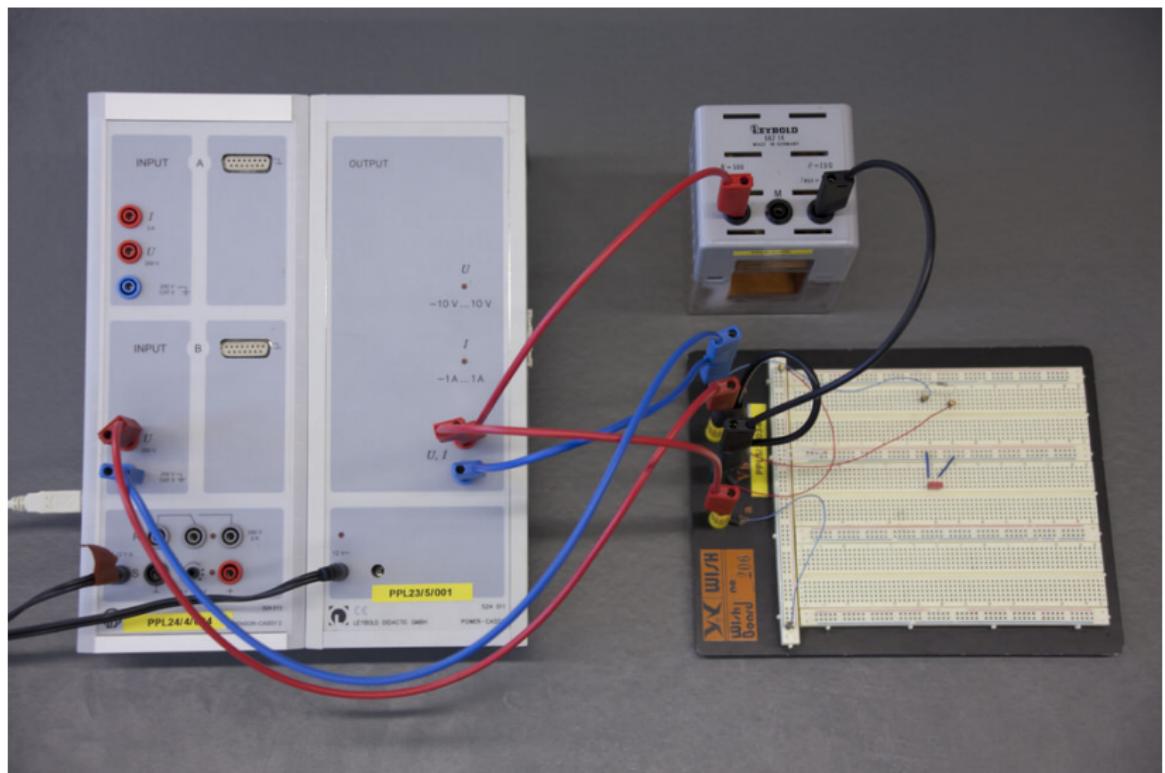
## 2 Michelson-Interferometer

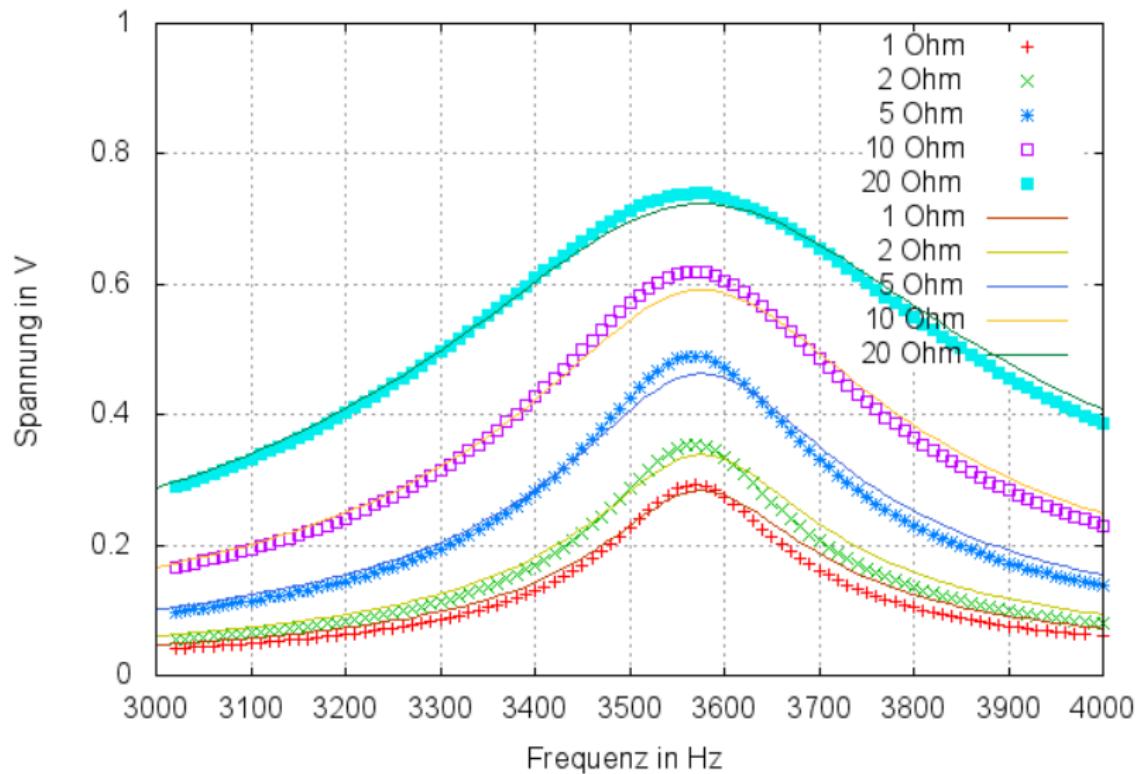
## 3 Pitot

## 4 Doppelpendel

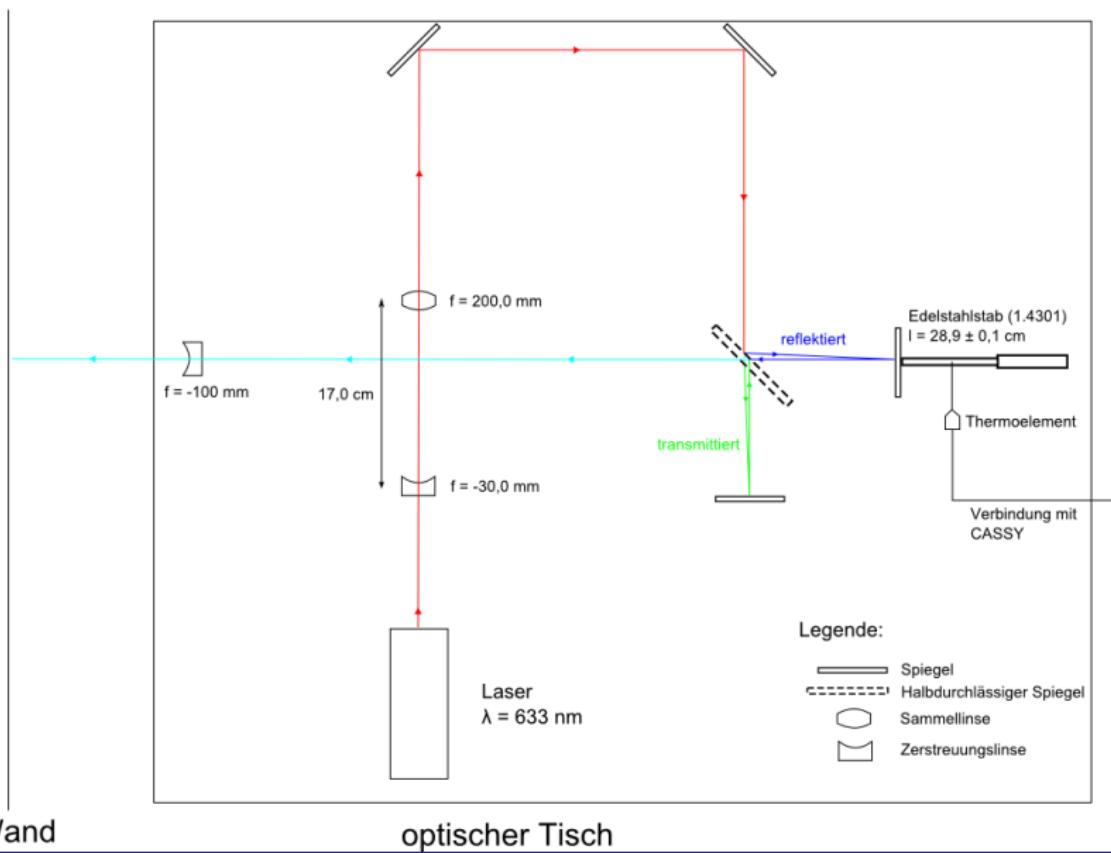
- Theorie
- Versuchsdurchführung

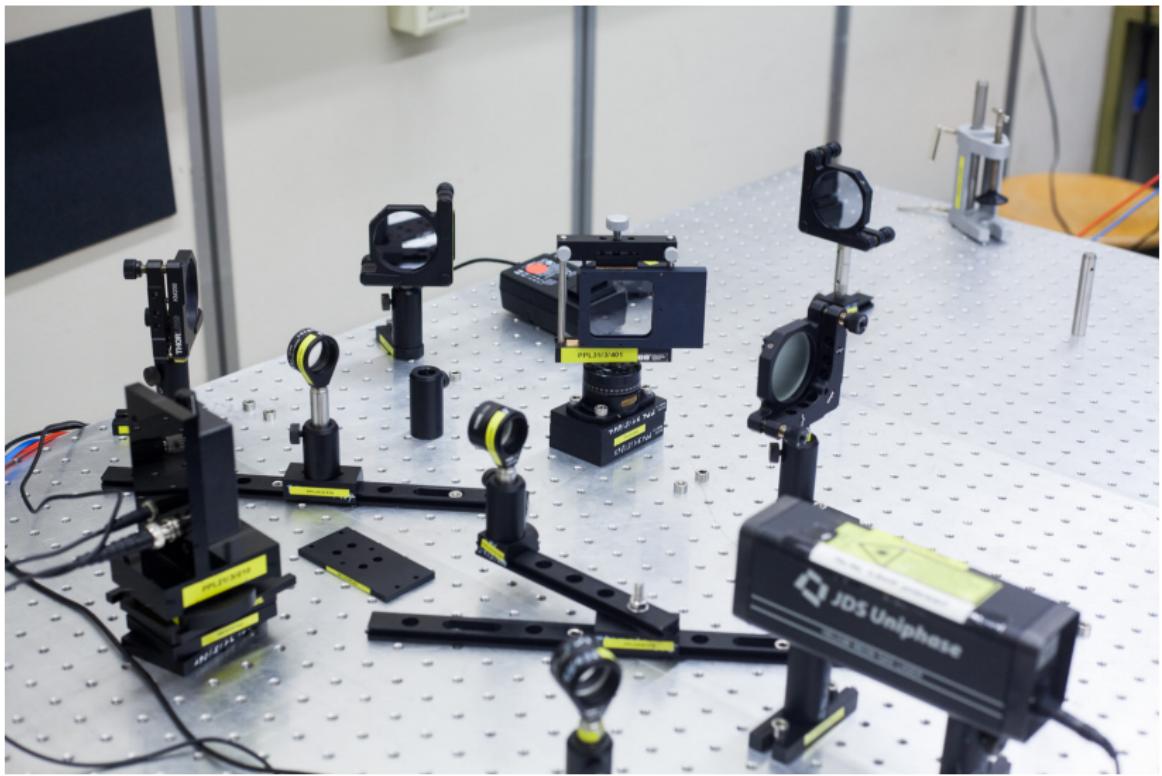






## Versuchsaufbau





### Abkühlen des Stabs



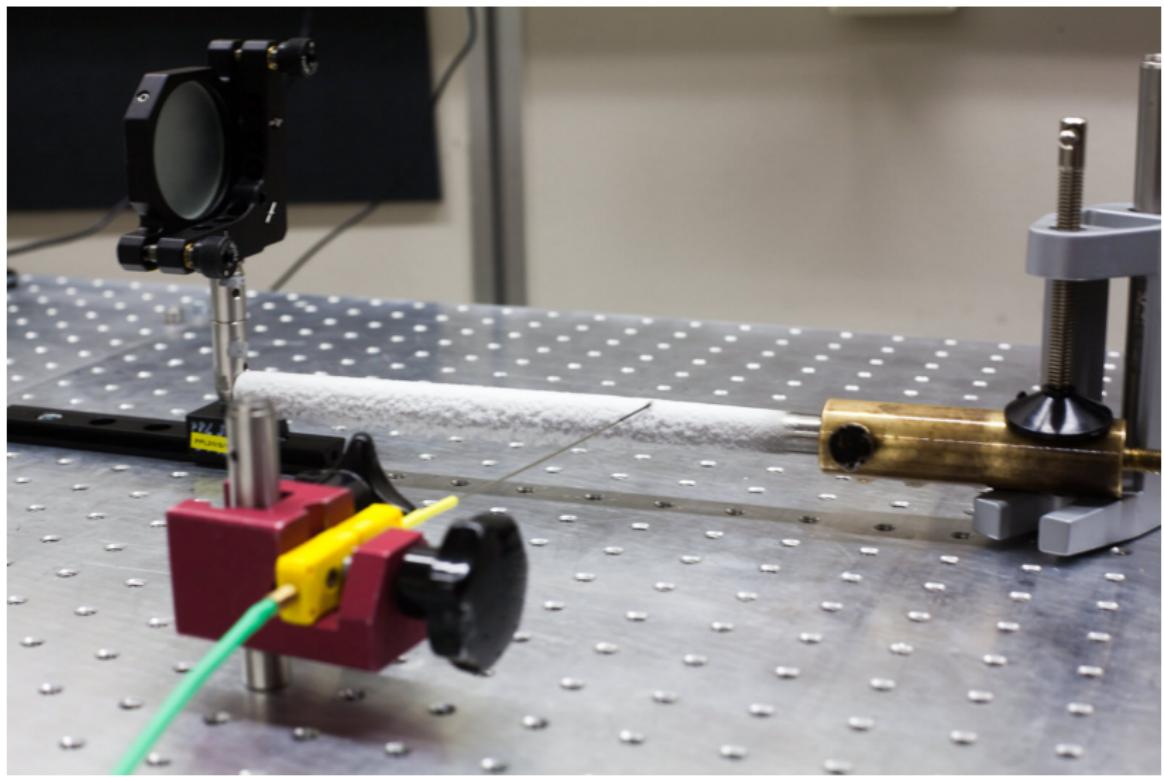
## Frequenzfilter

Michelson-Interferometer  
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Pitot  
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Doppelpendel  
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Temperaturmessung



## Frequenzfilter

Michelson-Interferometer  
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Pitot  
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Doppelpendel  
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Strahlführung



## Befestigung der Messrohre auf dem Dach



Frequenzfilter  
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Michelson-Interferometer  
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Pitot  
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Doppelpendel  
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## Aufbau von Manometer, Computer und Kamera im Fahrzeuginnenraum



Frequenzfilter  
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## Michelson-Interferometer

Pitot  
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## Doppelpendel

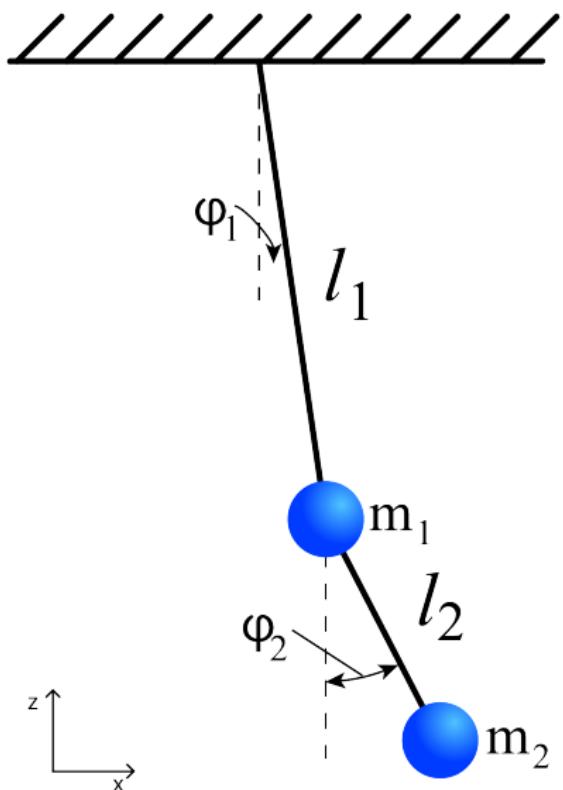
Karte der abgefahrenen Strecke



# Bestimmung der Bewegungsgleichungen mit Hilfe des Lagrangeformalismus

$$\frac{d}{dt} \frac{\partial L}{\partial \dot{q}_i} - \frac{\partial L}{\partial q_i} = 0 \quad (1)$$

$$L = \sum_i E_{kin,i} - V_i = \sum_i \frac{m_i}{2} \cdot \dot{\vec{x}_i}^2 - m_i \cdot g \cdot z_i \quad (2)$$



$$\vec{x}_1 = l_1 \cdot \begin{pmatrix} \sin \varphi_1 \\ -\cos \varphi_1 \end{pmatrix} \quad (3)$$

$$\vec{x}_2 = \vec{x}_1 + l_2 \cdot \begin{pmatrix} \sin \varphi_2 \\ -\cos \varphi_2 \end{pmatrix} \quad (4)$$

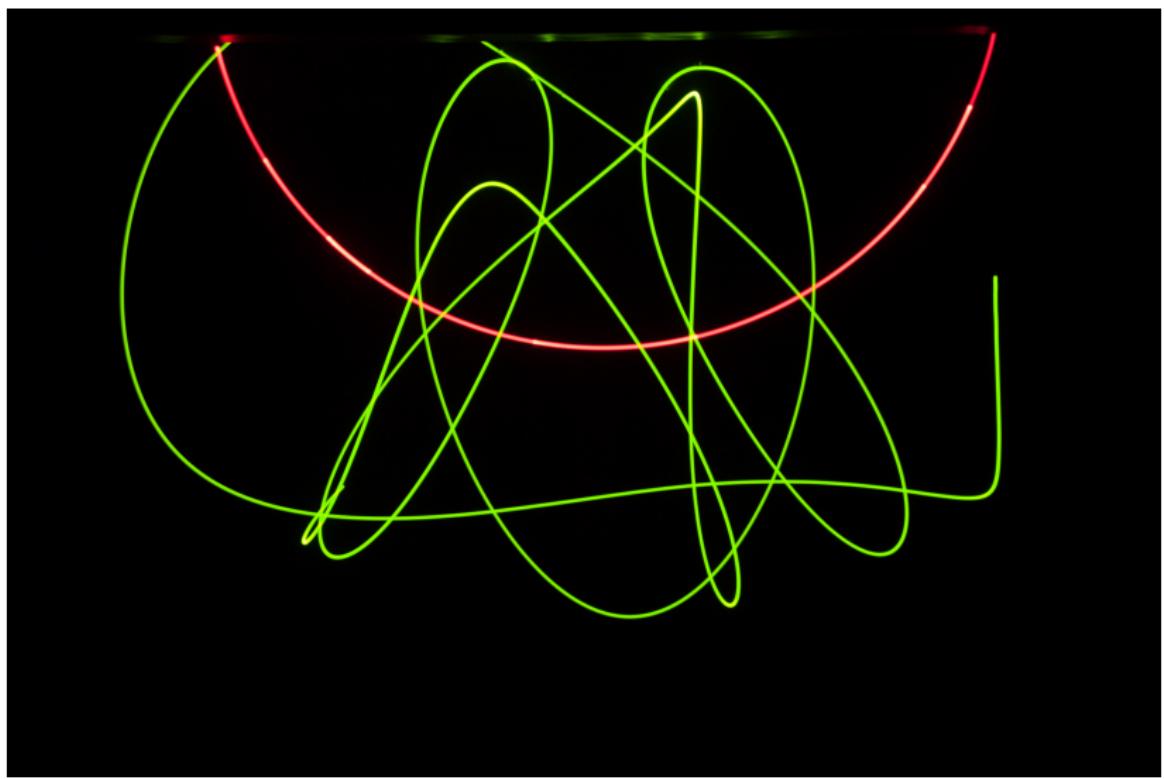
$$= \begin{pmatrix} l_1 \cdot \sin \varphi_1 + l_2 \cdot \sin \varphi_2 \\ -l_1 \cdot \cos \varphi_1 - l_2 \cdot \cos \varphi_2 \end{pmatrix}$$

Anwenden des Lagrange-Formalismus ergibt:

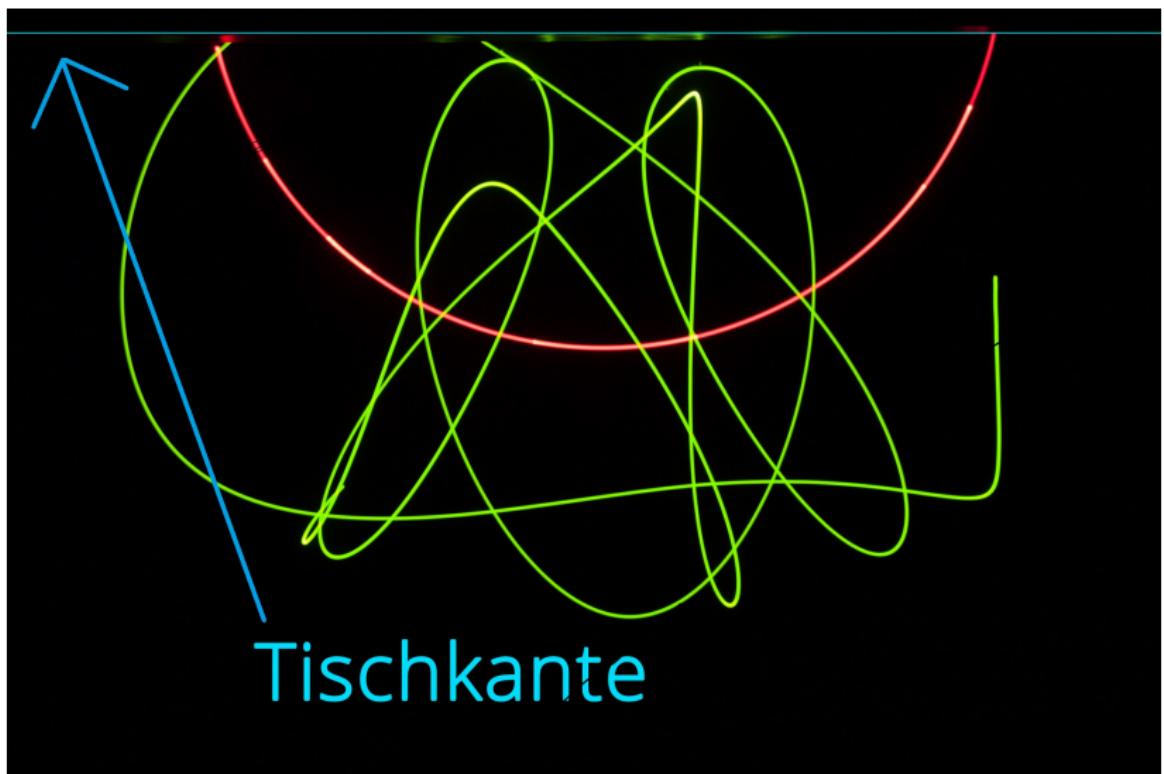
$$(m_1 + m_2)l_1\ddot{\varphi}_1 + m_2l_2\ddot{\varphi}_2 \cos(\varphi_1 - \varphi_2) + m_2l_2\dot{\varphi}_2^2 \sin(\varphi_1 - \varphi_2) + (m_1 + m_2)g \sin \varphi_1 = 0 \quad (5)$$

$$m_2l_2\ddot{\varphi}_2 + m_2l_1(\ddot{\varphi}_1 \cos(\varphi_1 - \varphi_2) - \dot{\varphi}_1^2 \sin(\varphi_1 - \varphi_2)) + m_2g \sin \varphi_2 = 0 \quad (6)$$

Versuchsdurchführung



Versuchsdurchführung



Frequenzfilter  
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Michelson-Interferometer  
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Doppelpendel  
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## Versuchsdurchführung



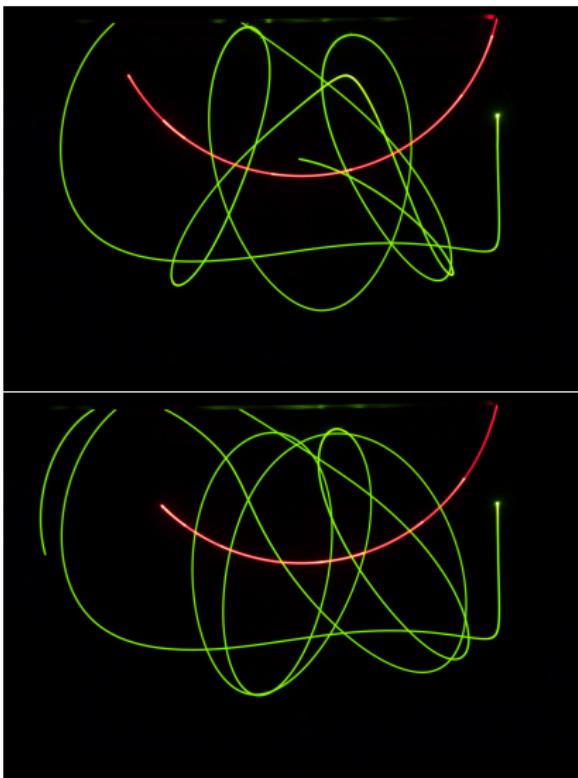
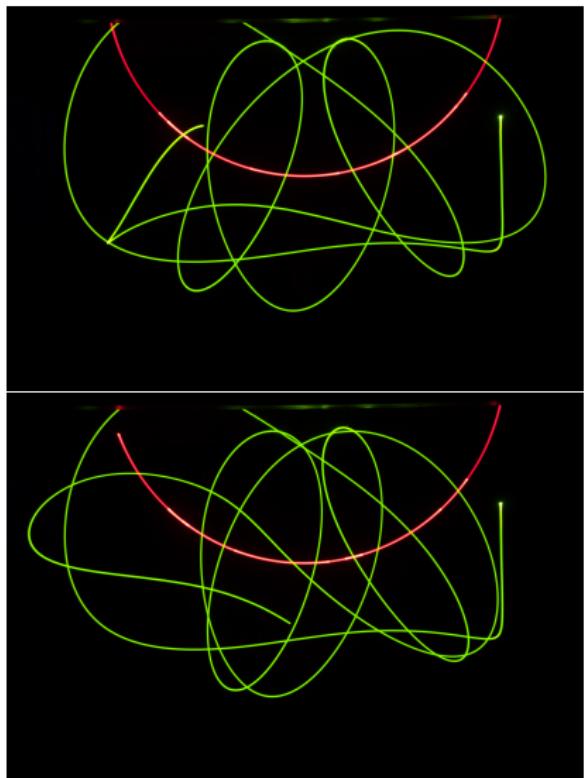
Frequenzfilter  
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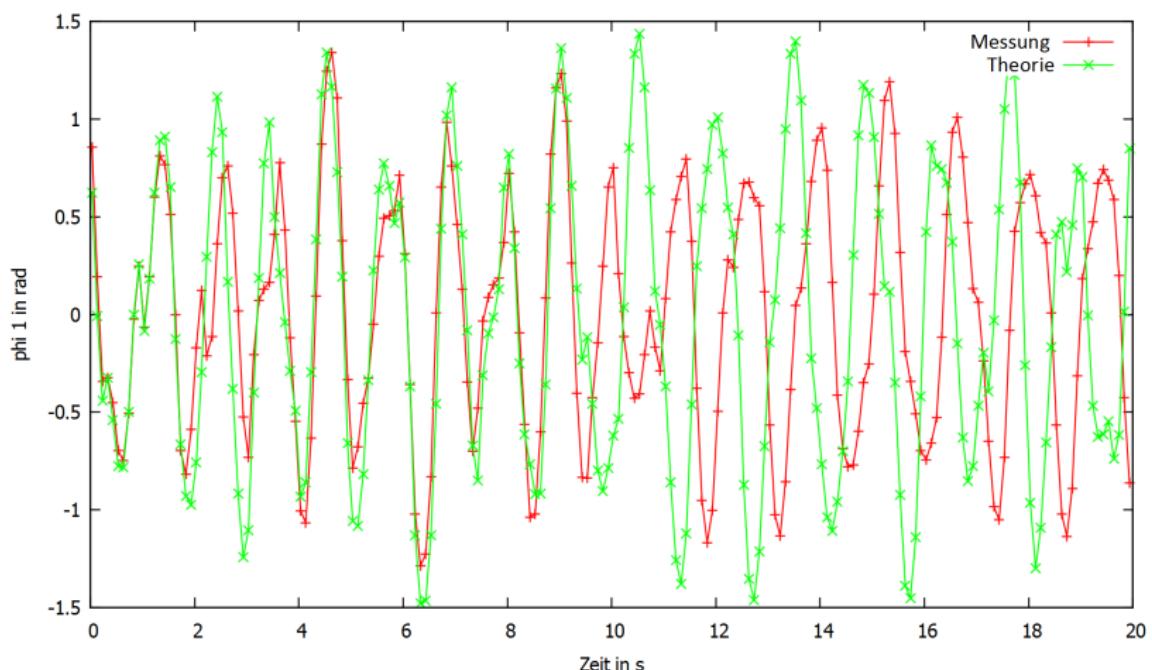
## Michelson-Interferometer

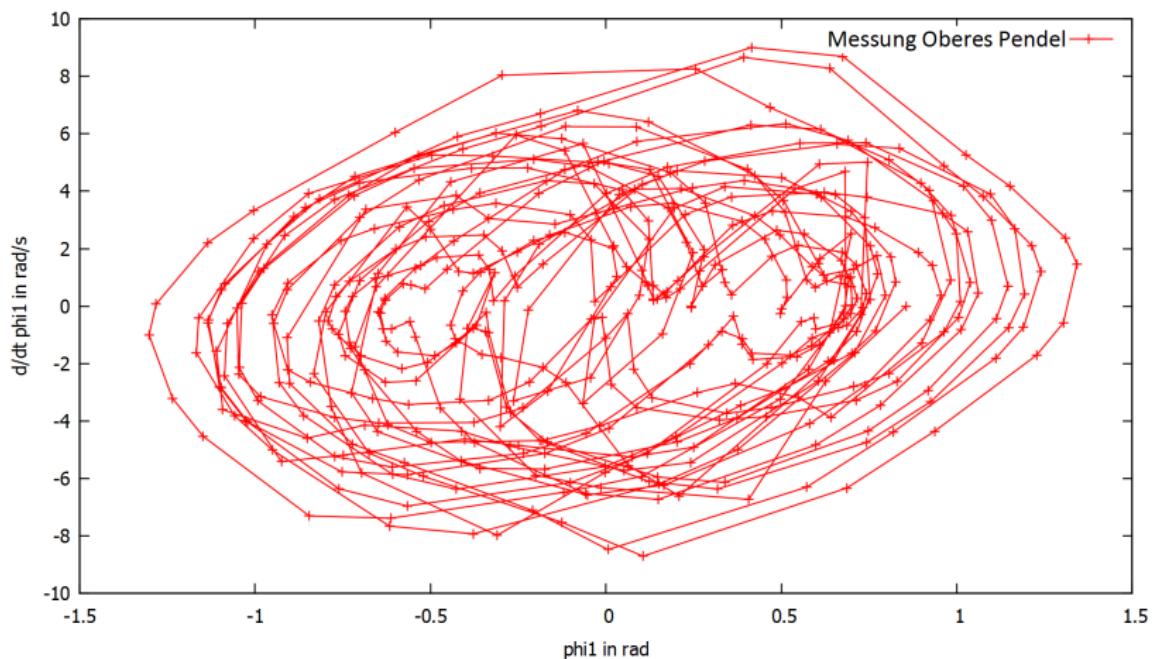
Pitot  
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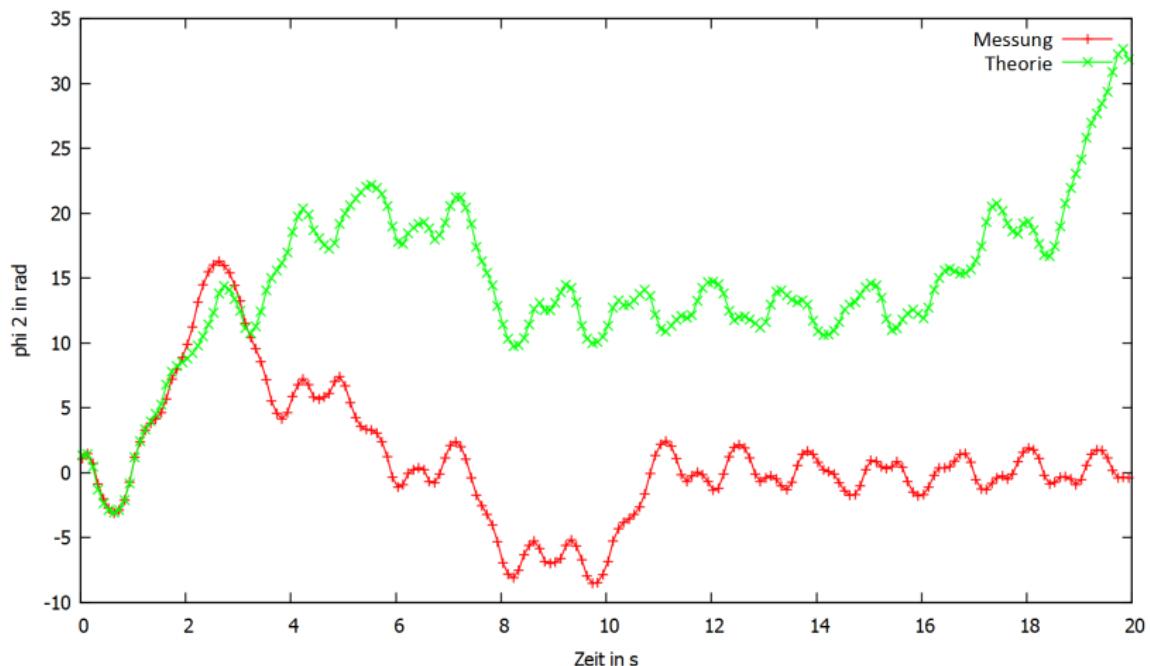
Doppelpendel  
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## Auswertung



Masze  $m_1$  – Messung und Simulation

Masse  $m_1$  – Phasenraumdiagramm

Masze  $m_2$  – Messung und Simulation

Masse  $m_2$  – Phasenraumdiagramm