<u>Satz</u> Die Änderung des Gesamtdrehimpulses eines Systems ist gleich der Summe der externen Drehmomente

<u>Def.</u> Drehmoment $\vec{N} = \vec{r} \times \vec{F}$

<u>Bew.:</u>

$$\frac{d\vec{L}}{dt} \overset{!}{=} \sum_{i=1}^{n} \vec{r}_i \times \vec{F}_i^{ext}$$

$$\vec{L} = \sum_{i=1}^{n} \vec{r}_i \times \vec{p}_i$$

$$\frac{d\vec{L}}{dt} = \cancel{\sum_i \dot{\vec{r}}_i \times \vec{p}_i} + \sum_i \vec{r}_i \times \dot{\vec{p}}_i =$$

$$\dot{\vec{p}}_i = \sum_{j \neq i} \vec{F}_{ij} + \vec{F}_i^{ext}$$

$$\frac{d\vec{L}}{dt} = \sum_i \vec{r}_i \times \left(\sum_{j \neq i} \vec{F}_{ij} + \vec{F}_i^{ext} \right) \overset{!}{=} \sum_{i=1}^{n} \vec{r}_i \times \vec{F}_i^{ext} \; ; \quad /$$

<u>Näml.</u> $\sum_{i,j \neq i} \vec{r}_i \times \vec{F}_{ij} = \vec{r}_1 \times \vec{F}_{12} + \vec{r}_2 \times \vec{F}_{21} + \dots$

$$= |f_{12}| \vec{r}_1 \times \vec{e}_{12} + |f_{12}| \vec{r}_2 \times \vec{e}_{21} + \dots =$$

Legen $\vec{e}_{12} = \dfrac{\vec{r}_2 - \vec{r}_1}{|\vec{r}_2 - \vec{r}_1|}$ $\curvearrowright$

$$= \frac{|f_{12}|}{|\vec{r}_1 - \vec{r}_2|} \left\{ \vec{r}_1 \times (\vec{r}_2 - \vec{r}_1) + \vec{r}_2 \times (\vec{r}_1 - \vec{r}_2) \right\} + \dots = 0 ;$$