



Superconducting magnetic bearings
for industrial applications

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Superconductivity

= Superconductivity (SL)

- + Zero electric resistivity
- + Zero losses
- Sophisticated cooling

= High-temperature -
superconductivity (HTSC)

- + Zero electric resistivity
- + Zero losses
- Easy cooling

3 x smaller

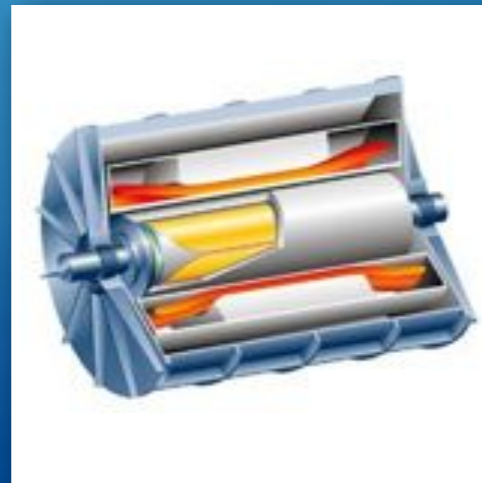
3 x lighter

efficient

CO₂ reduction



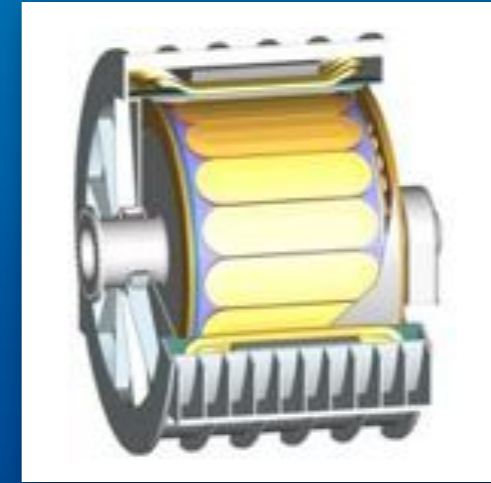
Cable



Motor

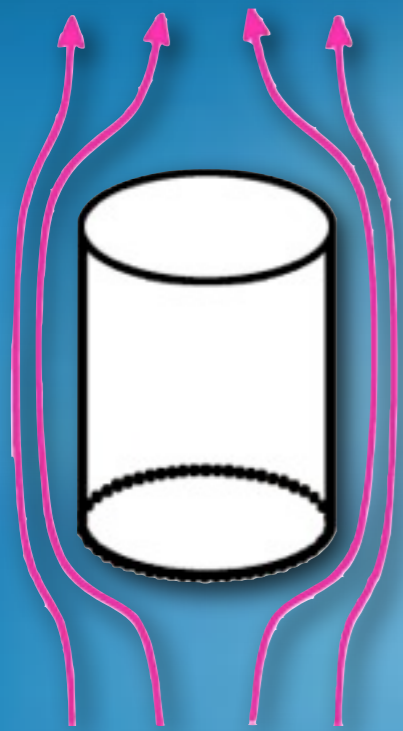


Trafo

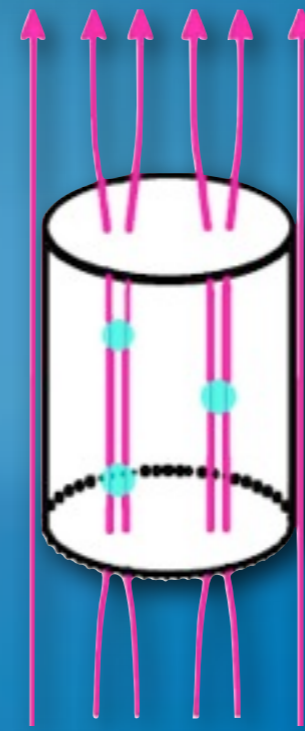


Generator

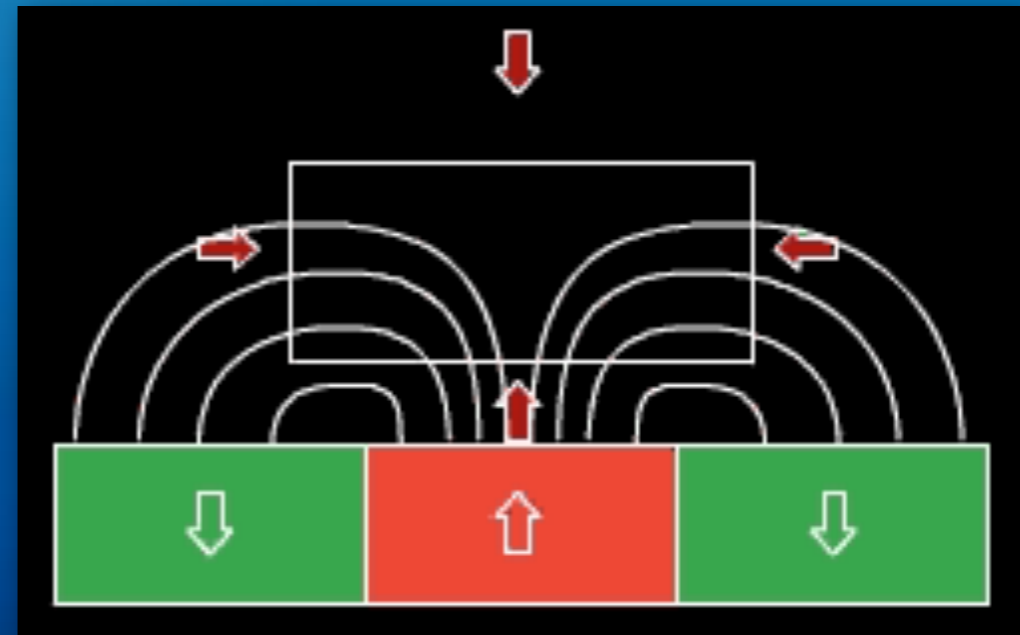
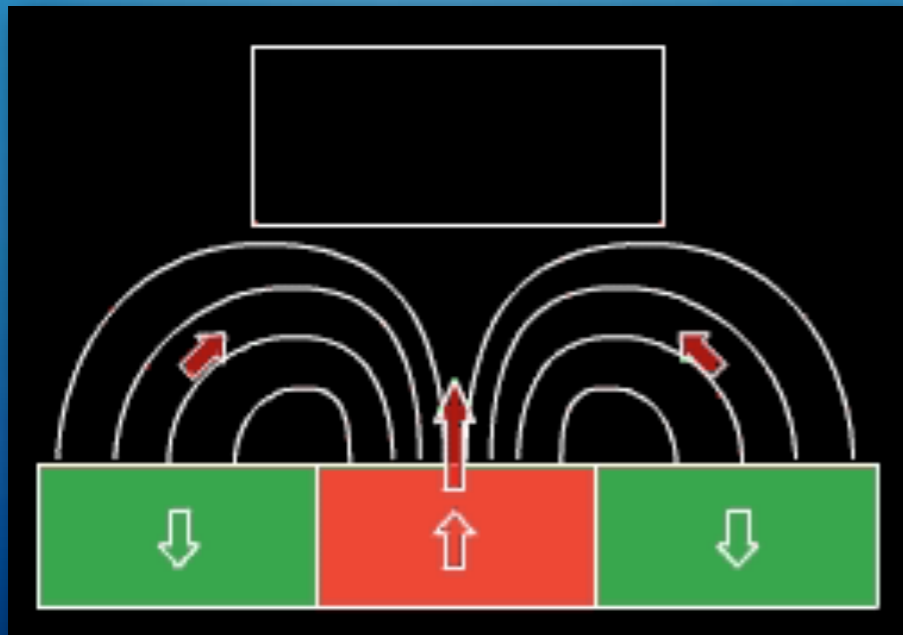
Superconductor in a magnetic field



- = Superconductor displaces magnetic field
- = Meißner-Ochsenfeld-Effect or
- = Ideal diamagnet
- = Magnetic field pushes out the Superconductor!

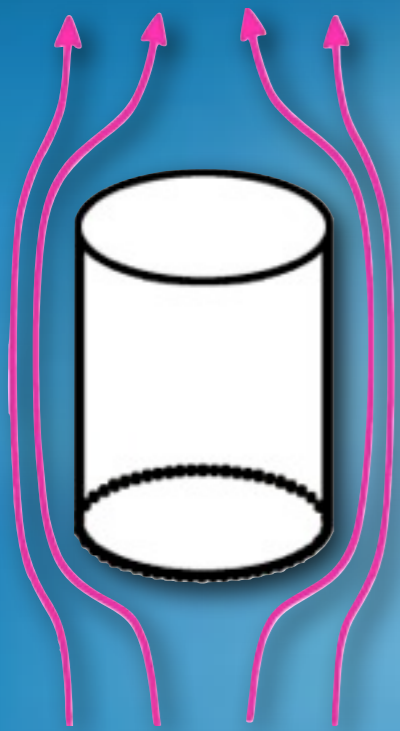


- = Typ-II-Superconductor
- = Magnetic field can penetrate the SC - Fluxlines
- = Pinningeffect
- = Superconductor memorizes the field

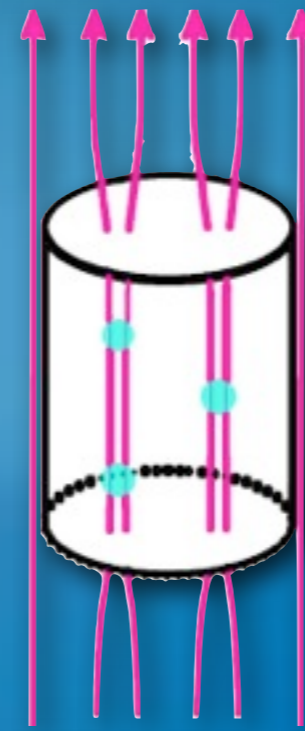


Field displacement and Fluxpinning

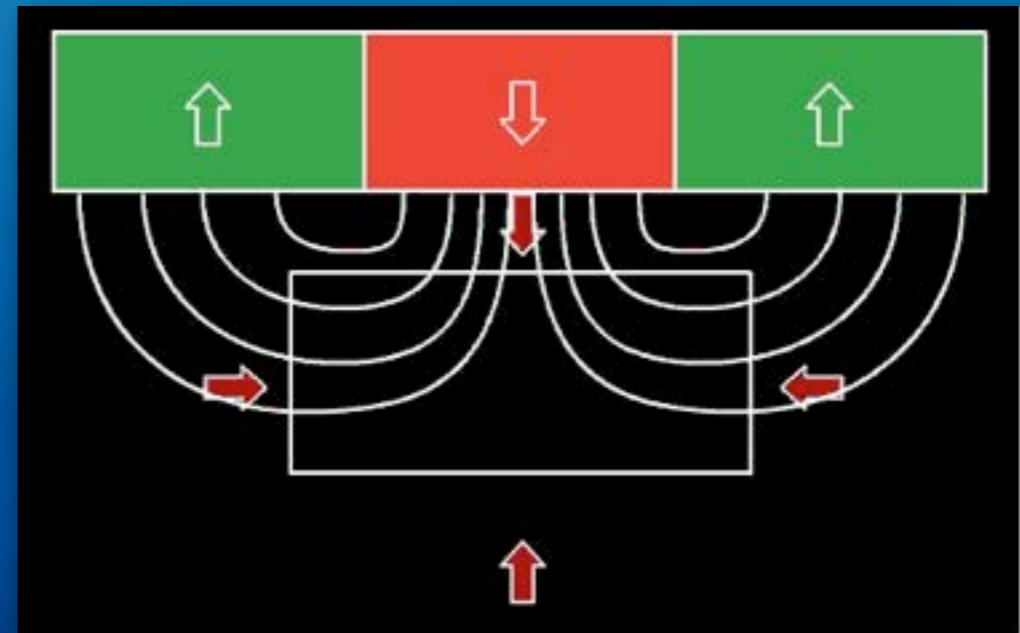
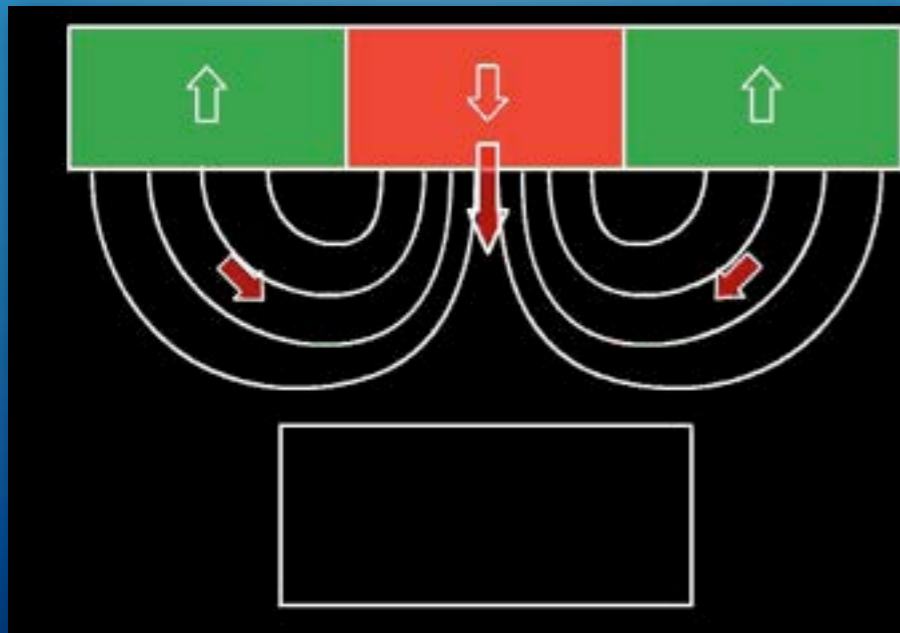
Supraleiter im Magnetfeld



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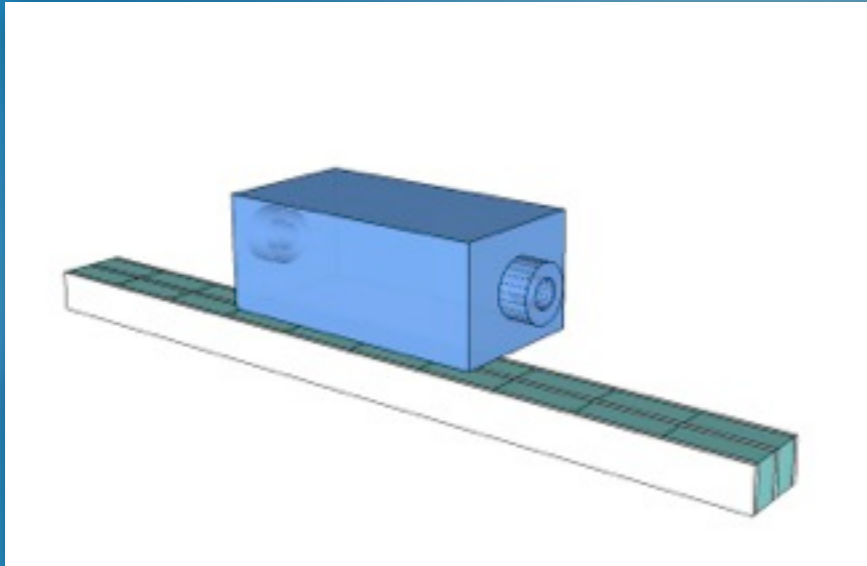


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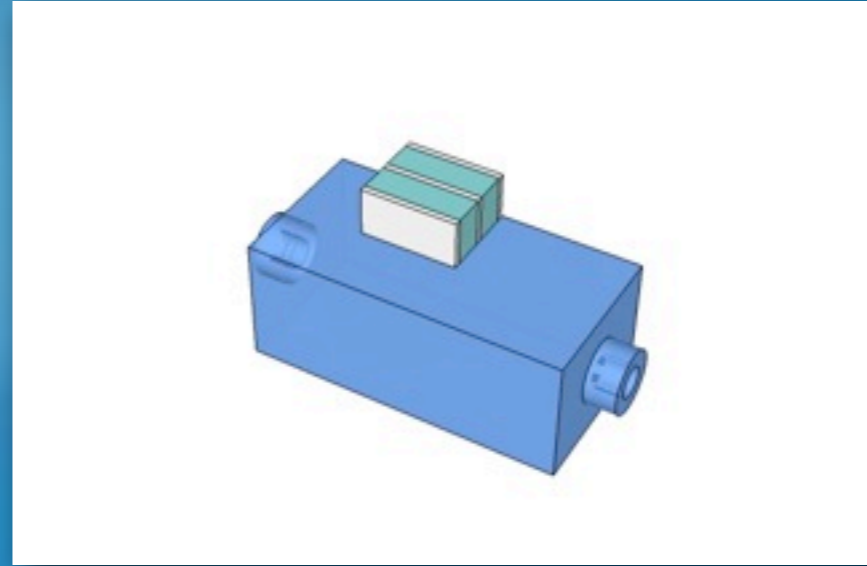


Bearing types

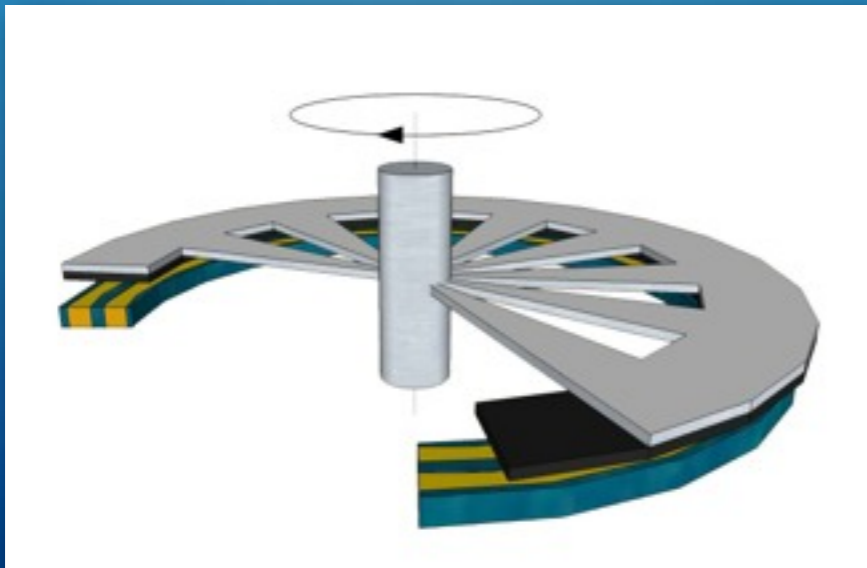
Linear bearing



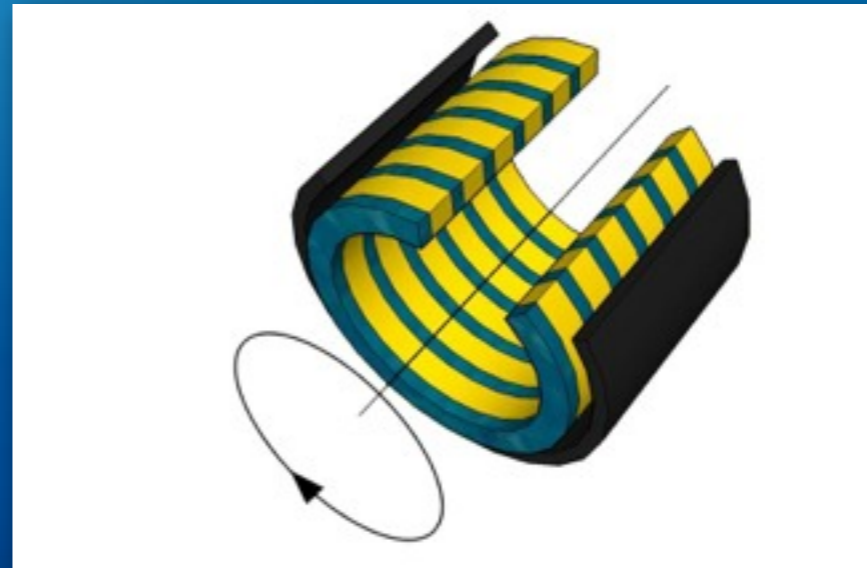
Simple support



Axial bearing



Radial bearing



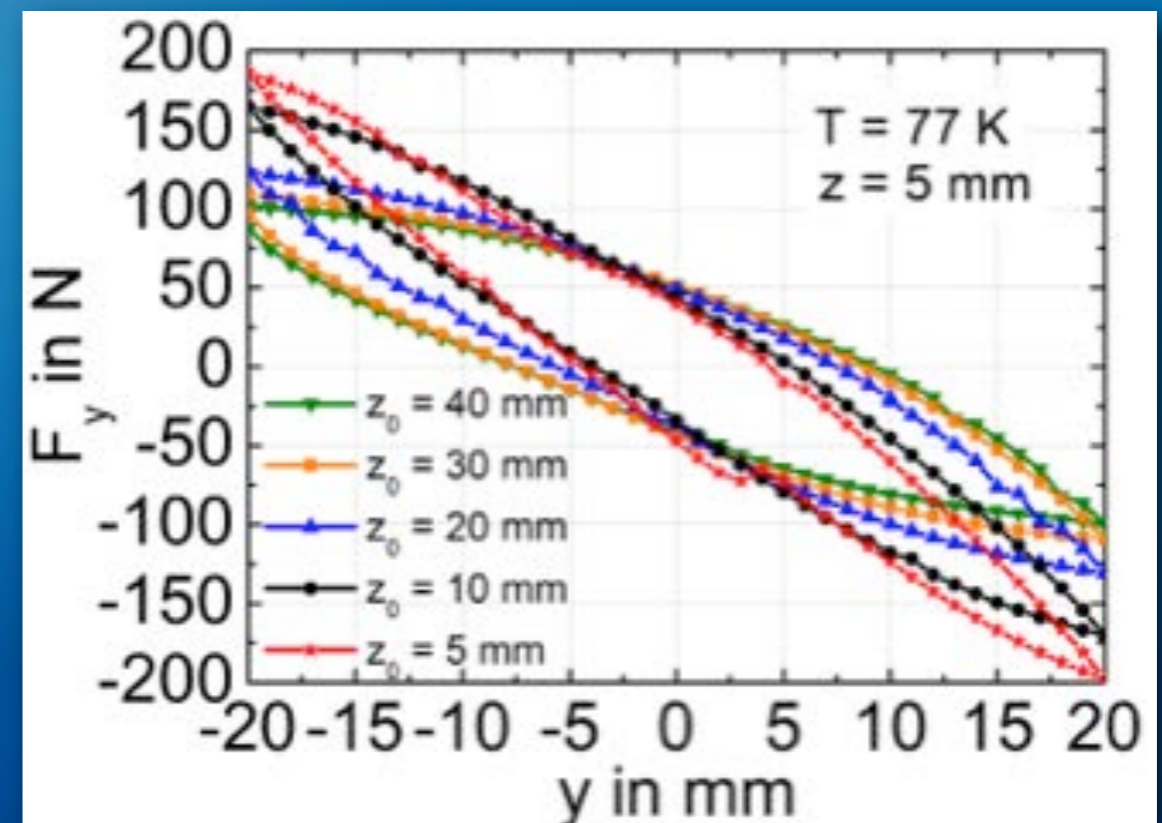
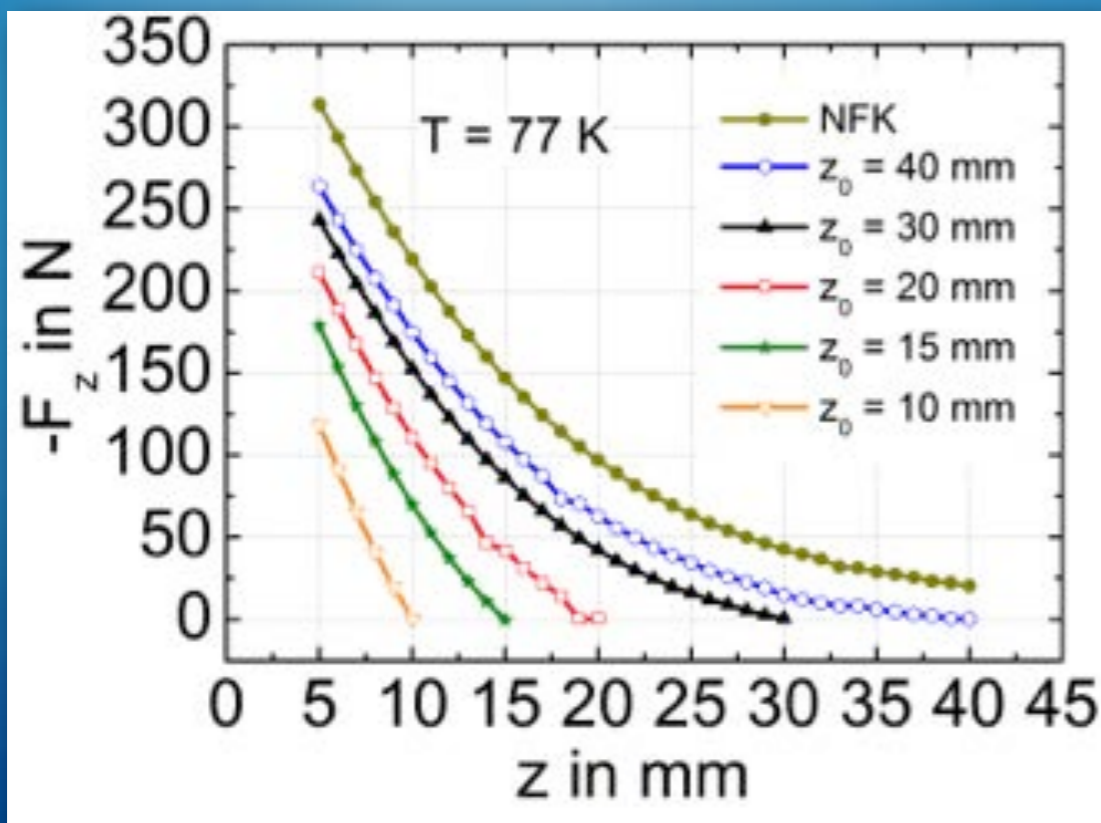
Levitation Characteristics

Linear Bearing

SC area: 120 x 30 mm

SC temperature: 77 K

Magnetic guideway width: 120



SupraTrans II

SupraTrans



SupraTrans II

80 m closed loop

Guideway switch

Wireless energy transmission

200 kg pay-load

0,1 l/h LN2 consumption

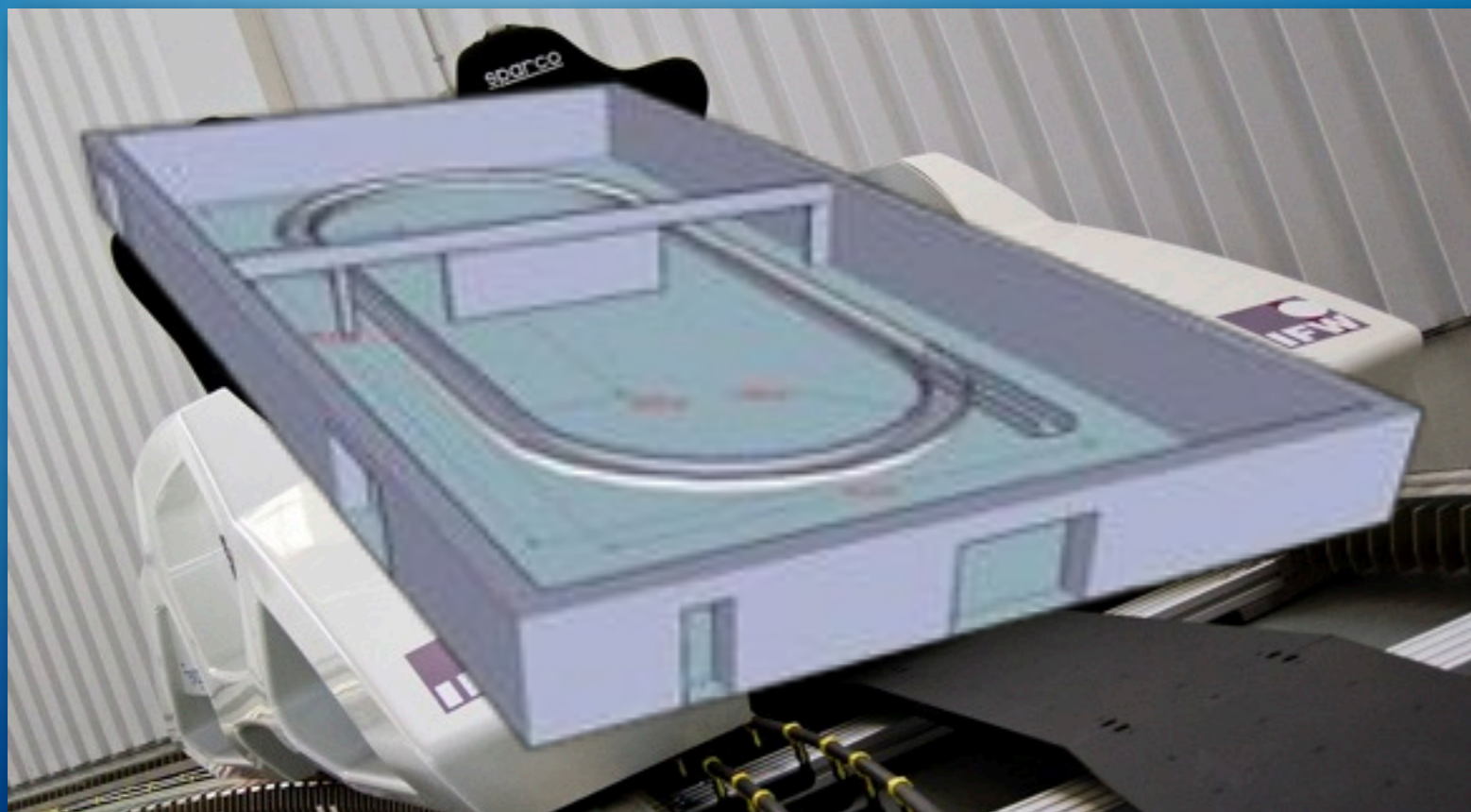
1 m/s² acceleration

2 independent braking systems

On bord / remote vehicle control

Design: Airport Gate-to-Gate

Shuttle

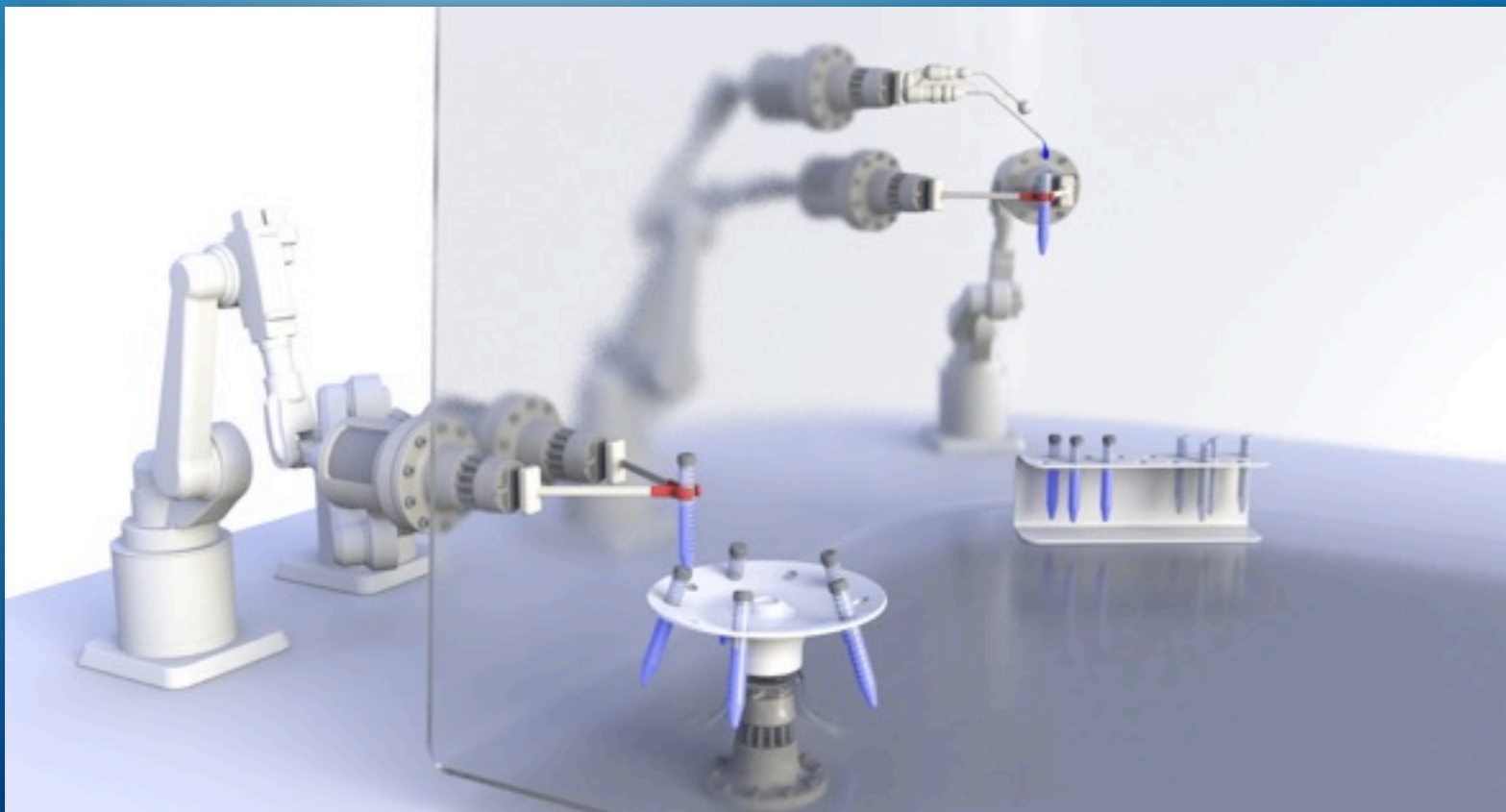


Supraleiterlager + Manipulatoren



= Manipulation of samples

= Process control



Supraleiter-Kryostat



= compact

= plug & play

= efficient !

= Lifetime to be improved

Working gap	5 mm	3 mm
Vertical stiffness	12 N/mm	21 N/mm
Lateral stiffness*	4 N/mm	6.3 N/mm
Superconductor area	261 mm ²	
Cooling power at 67 K	1.6 W	
Minimum temperature	65 K	
Input power	60 W	
Voltage	28 V	
Dimensions (Diameter, Height)	ø 194 x 225 mm	
Weight cryosystem	5.2 kg	
Weight magnetic puck	0.67 kg	
Ambient temperature range	- 40 ... + 40 °C	

FESTO SupraMotion



= Search for scenarios of the application of superconducting bearings in industrial automation.

= SupraLinearMotion

= SupraHandling

= SupraPicker

FESTO SupraMotion 2.0



= Search for scenarios of the application of superconducting bearings in industrial automation.

= SupraHandling 2.0

= SupraShuttle

= SupraChanger

= evico

Thank you
for your attention