

Superconducting Magnetic Levitation (MagLev) for Urban Transportation

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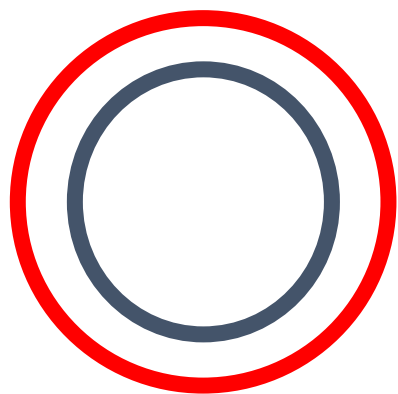
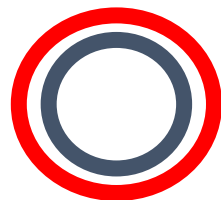


18th International Symposium on Magnetic Bearings



18 – 21 July 2023 Lyon France

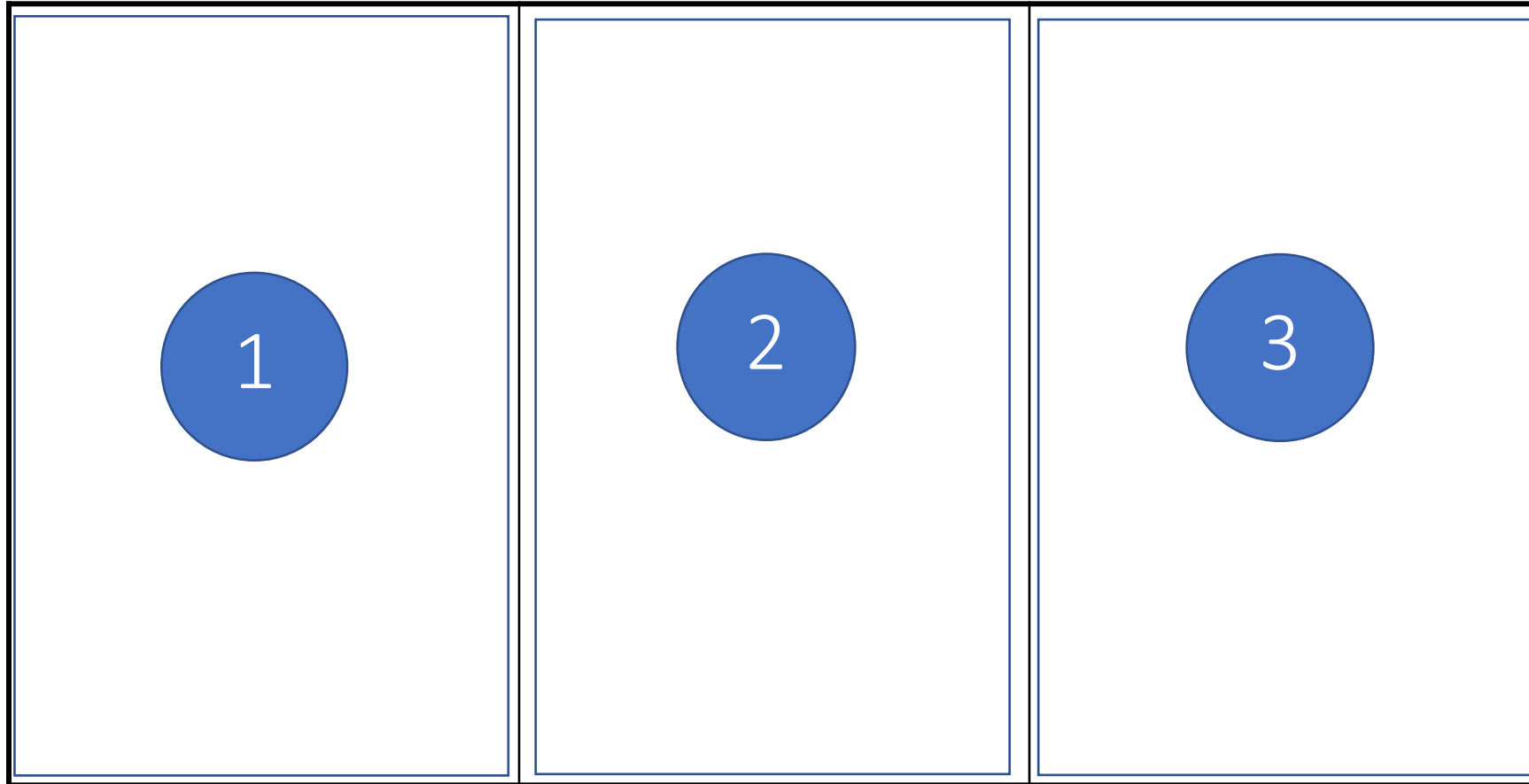
Magnetic Bearings



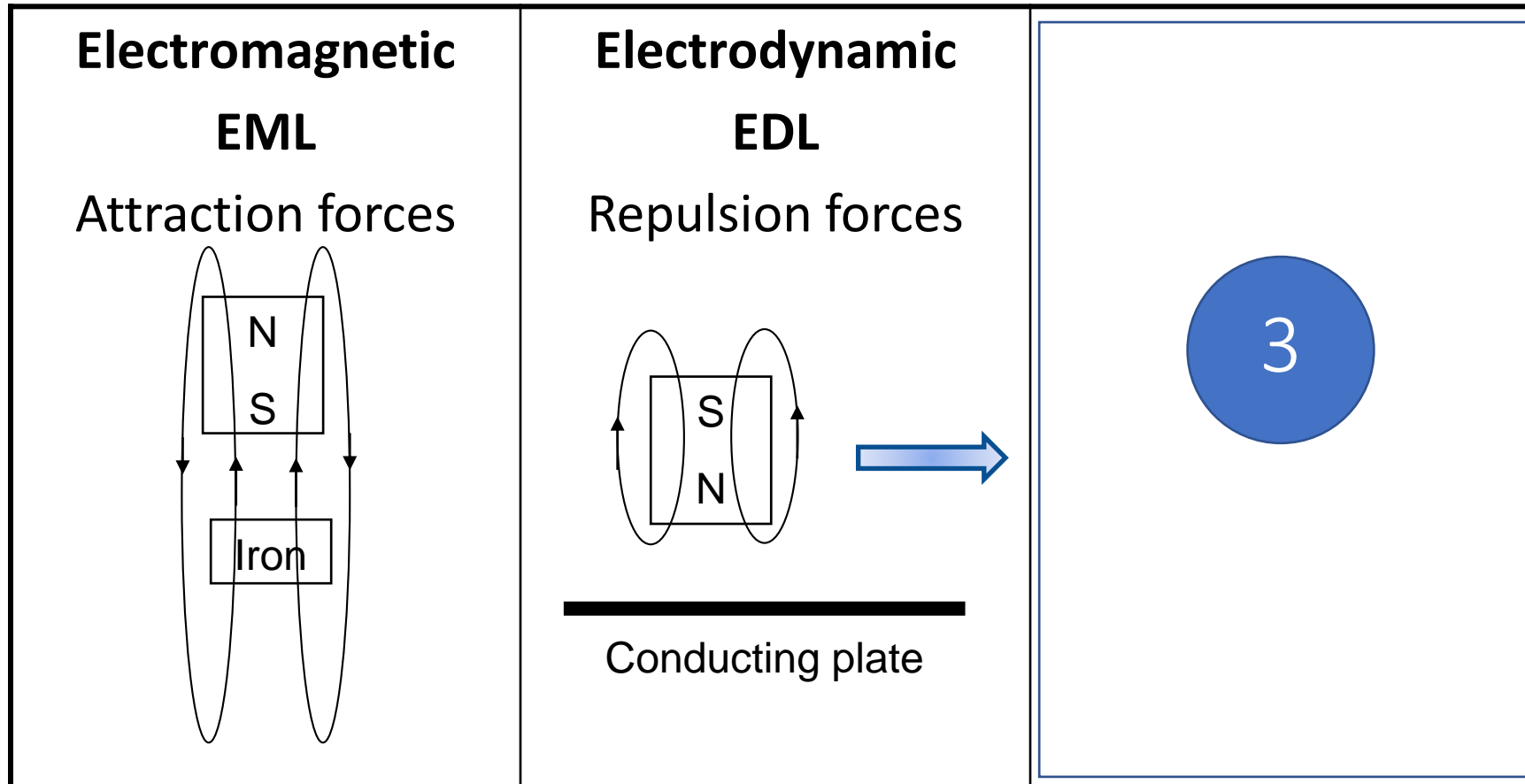
MagLev Vehicles



Magnetic Forces for Levitation



Magnetic Forces for Levitation

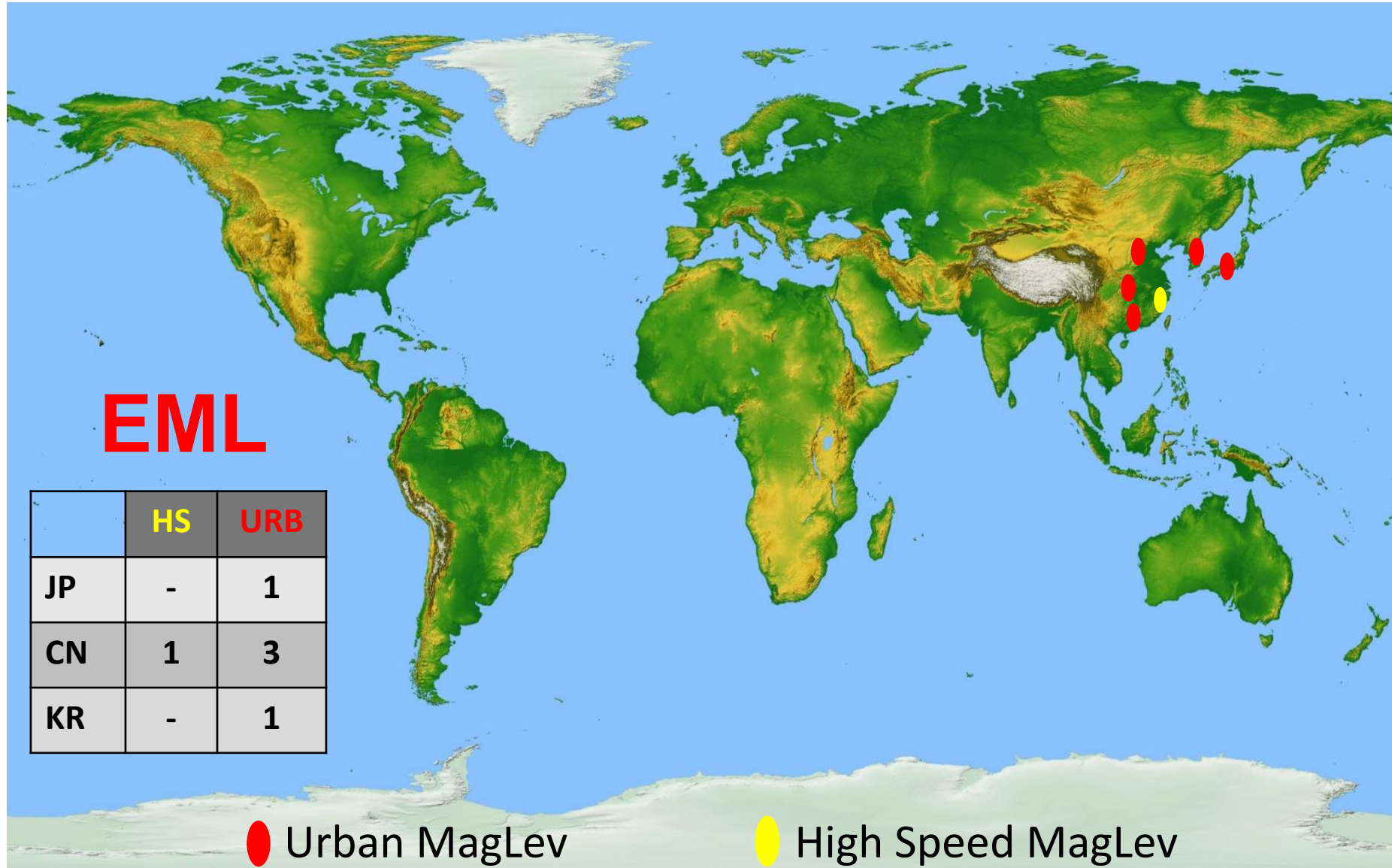


~ 1960

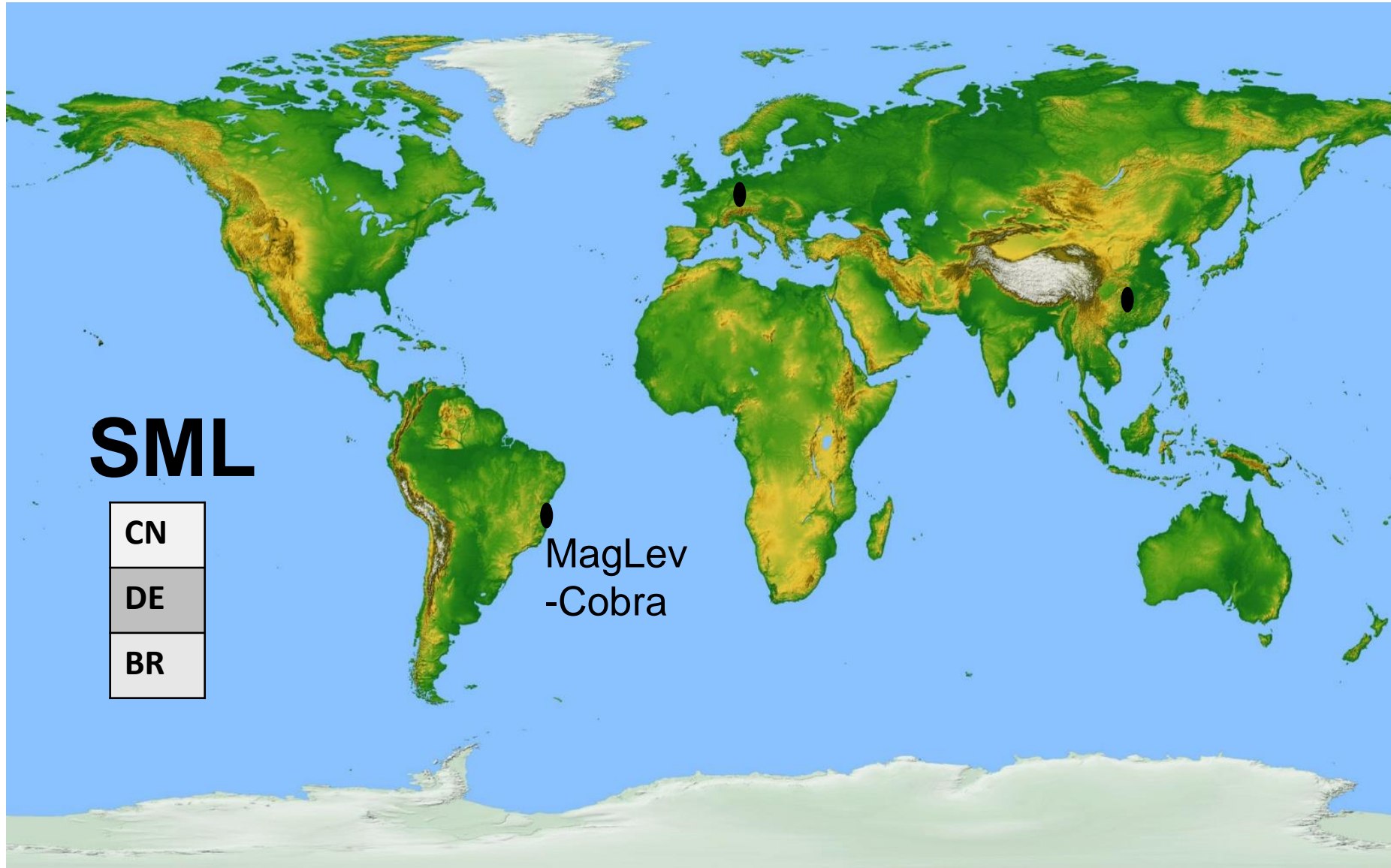
~ 1990



MagLev: Commercial Operation



MagLev SML in the World



The MagLev-Cobra project

Graphical Abstract



Linear motor

Rails of magnets

200 meters long line – outside the laboratory
Vehicle for 20 passengers



Superconductors refrigerated with LN₂ inside of cryostats



COPPE 50
UFRJ

LA SUP
LABORATÓRIO DE APLICAÇÕES EM SUPERCONDUTORES
ESCOLA POLITÉCNICA - UFRJ

MAGLEV 2014



The 22nd International Conference on Magnetically
Levitated Systems and Linear Drives

28th September to 1st October 2014 ■ Rio de Janeiro ■ Brazil

MagLev-Cobra – 1st October 2014



MagLev-Cobra development steps

TRL1-TRL2-TRL3

Proof of concept



TRL4-TRL5

Laboratory prototype



TRL6-TRL7

Outdoor prototype



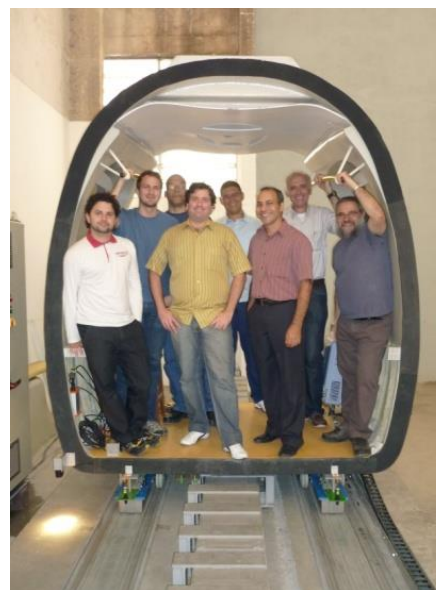
2000-2006
CNPq-FAPERJ

2008-2012
FAPERJ

2012-2019
PPP/BNDES



small scale prototype



full scale prototype
indoor



full scale prototype
final environment

COPPE
UFRJ



MagLev
Cobra



Veículo de Levitação Magnética para transporte urbano desenvolvido pela COPPE|UFRJ.

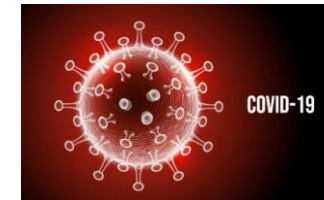
Visitação
aberta ao público

Terças-feiras
das 11h às 15h

Centro de Tecnologia
Bloco H, 2º andar



From october 2015
until march 2020



~20.000 visitors

MagLev-Cobra development steps

TRL1-TRL2-TRL3

Proof of concept →

2000-2006
CNPq-FAPERJ



small scale prototype

TRL4-TRL5

Laboratory prototype →

2008-2012
FAPERJ



full scale prototype
indoor

TRL6-TRL7

Outdoor prototype

2012-2019
PPP/BNDES



full scale prototype
final environment



TRL8-TRL9

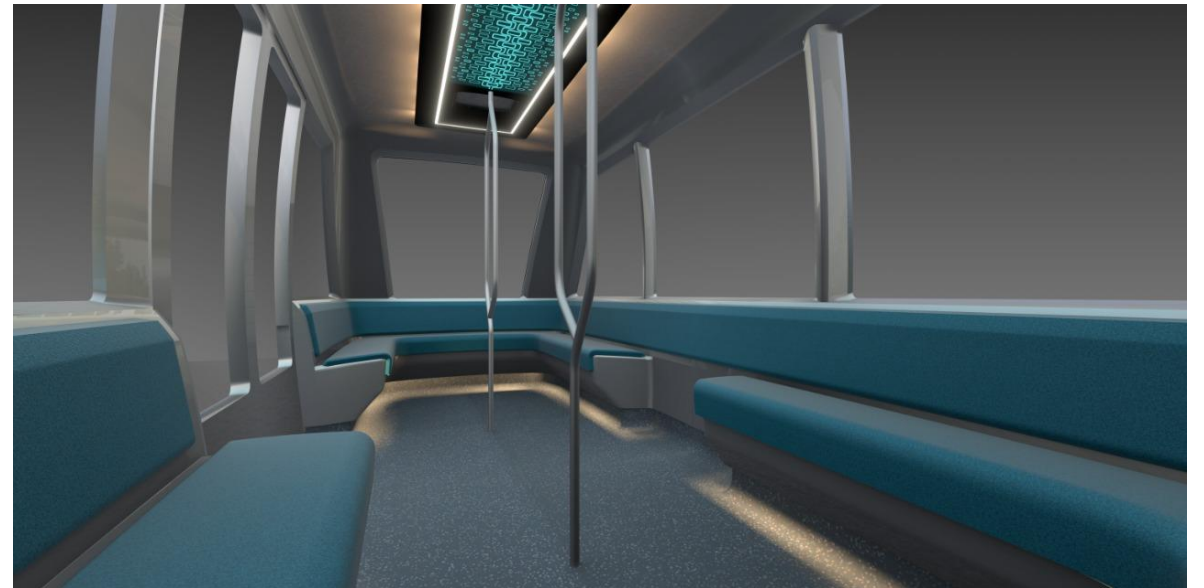
First product

2022-

MagLev² - Cobra

second generation (planned for dec. 2023)

- Improved linear traction
- Improved mechanical structure
- Autonomous (APM – Automated People Mover)



MagLev² - Cobra

<i>English</i>	<i>Portuguese</i>	<i>Latin</i>	<i>Simbol</i>

MagLev² - Cobra

<i>English</i>	<i>Portuguese</i>	<i>Latin</i>	<i>Simbol</i>
Magnetic	Magnético	Magneticus	Mag

MagLev² - Cobra

<i>English</i>	<i>Portuguese</i>	<i>Latin</i>	<i>Simbol</i>
Magnetic	Magnético	Magneticus	Mag
Levitation	Levitação	Levitatio	Lev

MagLev² - Cobra

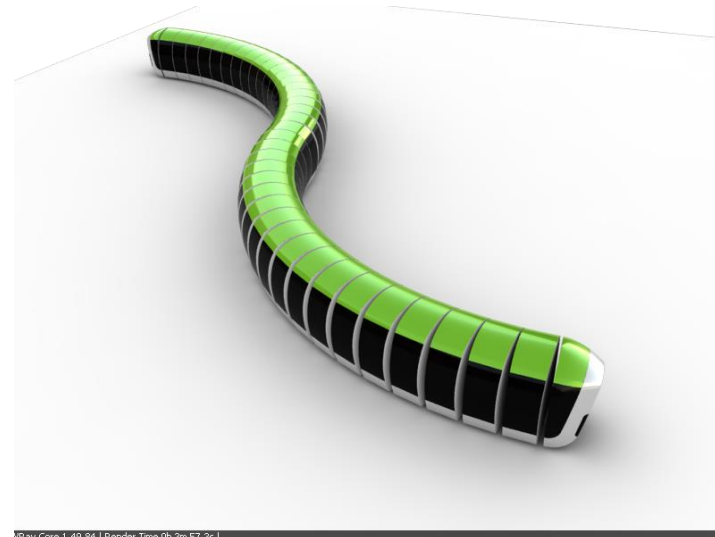
<i>English</i>	<i>Portuguese</i>	<i>Latin</i>	<i>Simbol</i>
Magnetic	Magnético	Magneticus	Mag
Levitation	Levitação	Levitatio	Lev
Light	Leve	Levis	Lev

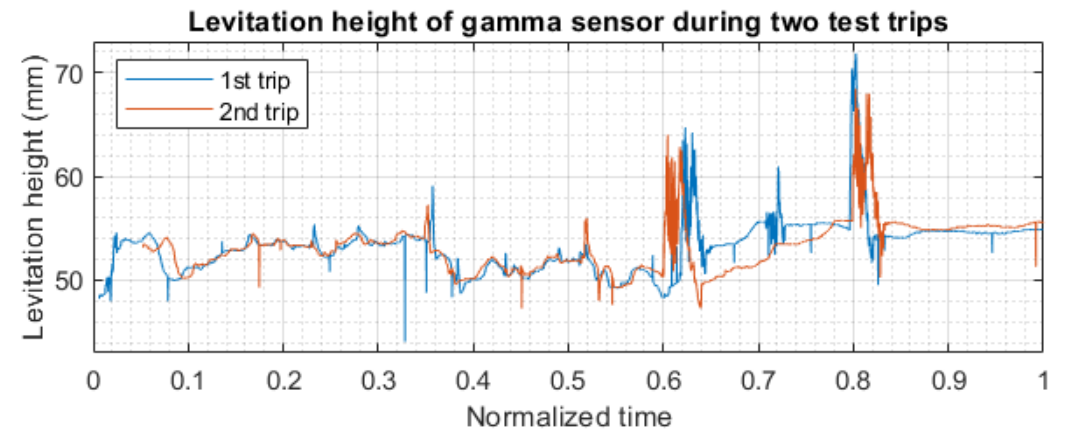
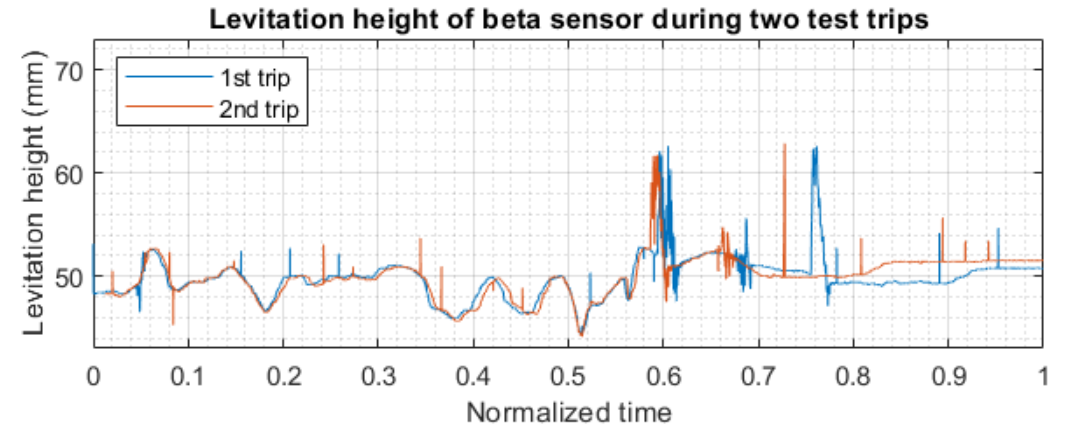
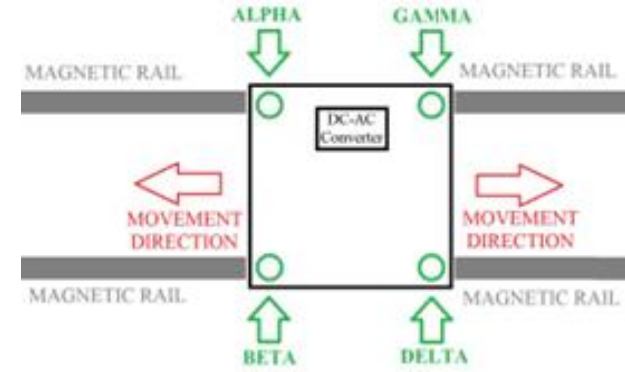
MagLev² - Cobra

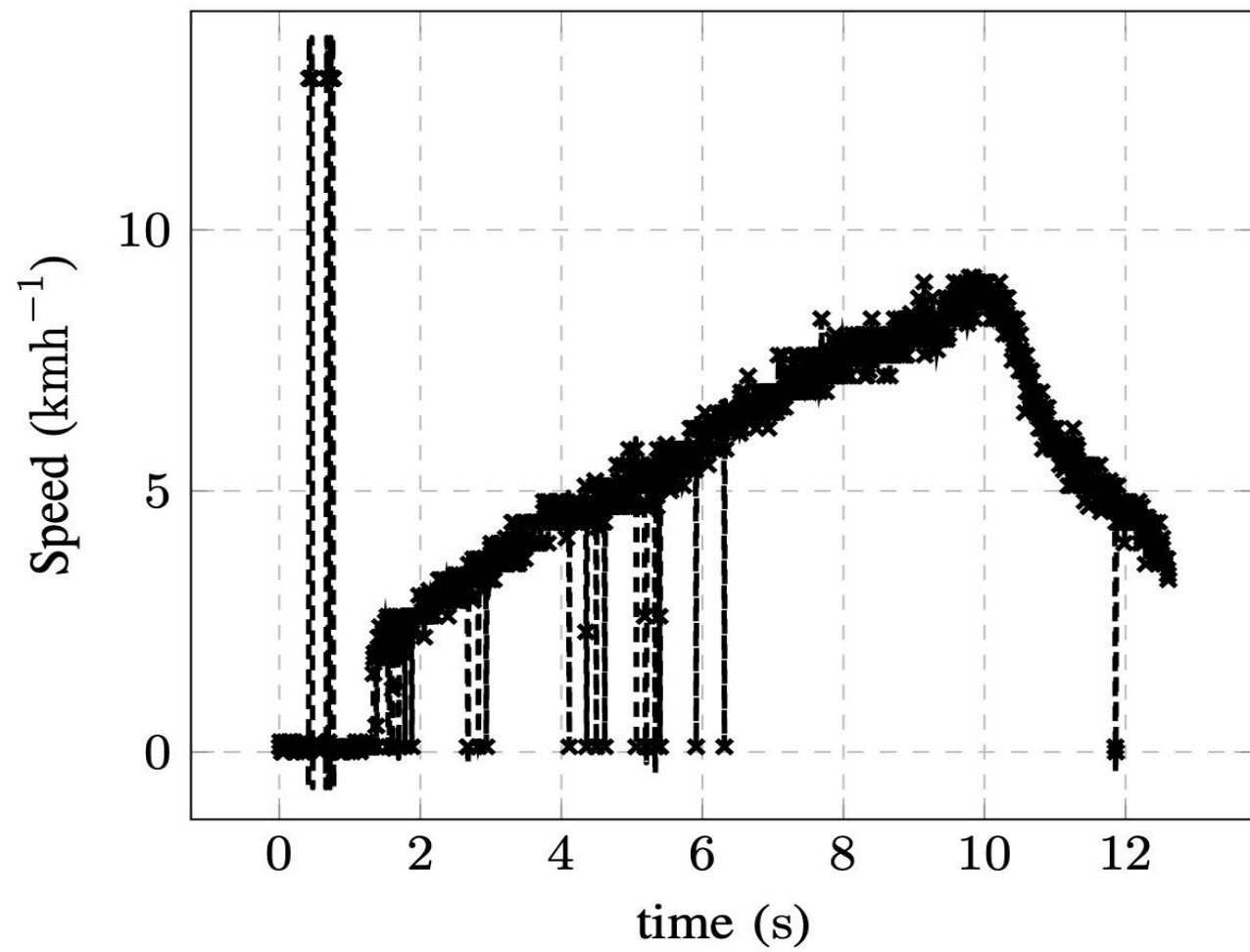
<i>English</i>	<i>Portuguese</i>	<i>Latin</i>	<i>Simbol</i>
Magnetic	Magnético	Magneticus	Mag
Levitation	Levitação	Levitatio	Lev
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Cobra	Cobra naja	-	Cobra

MagLev² - Cobra

<i>English</i>	<i>Portuguese</i>	<i>Latin</i>	<i>Simbol</i>
Magnetic	Magnético	Magneticus	Mag
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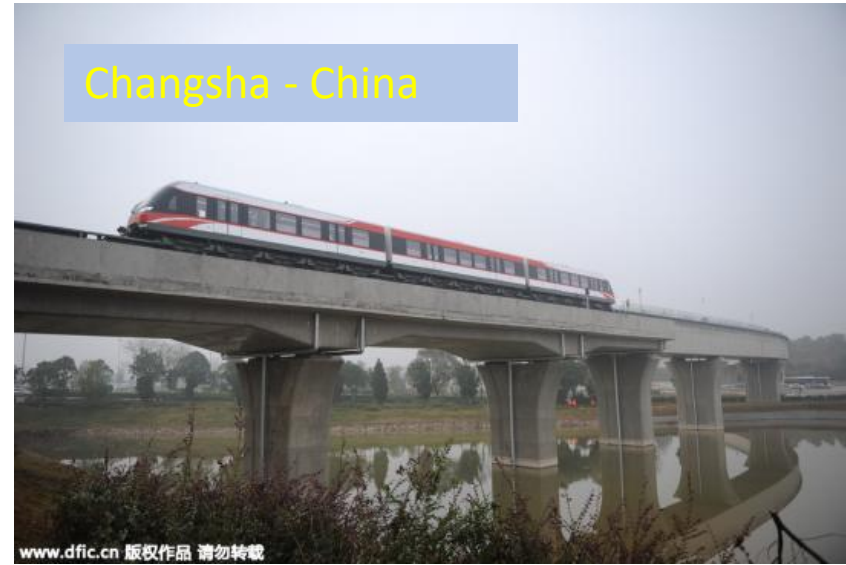


SML x EML: slimmer structure

Linimo - Japan



Changsha - China



Ecobee - Korea



MagLev-Cobra



SML x EML : more robust (stable) and simpler

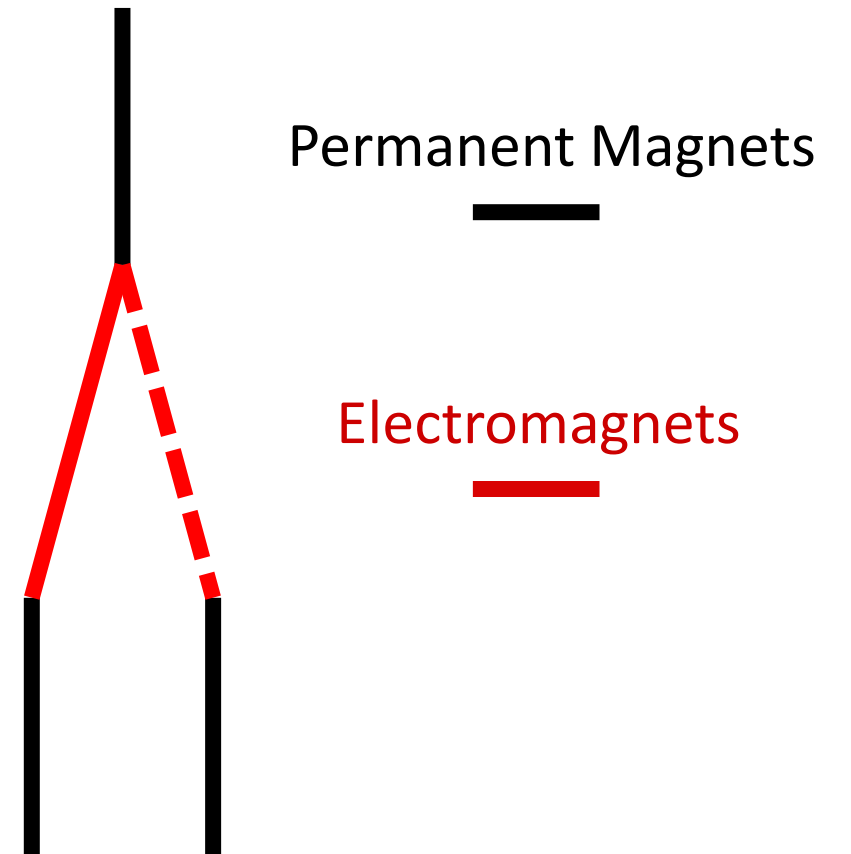
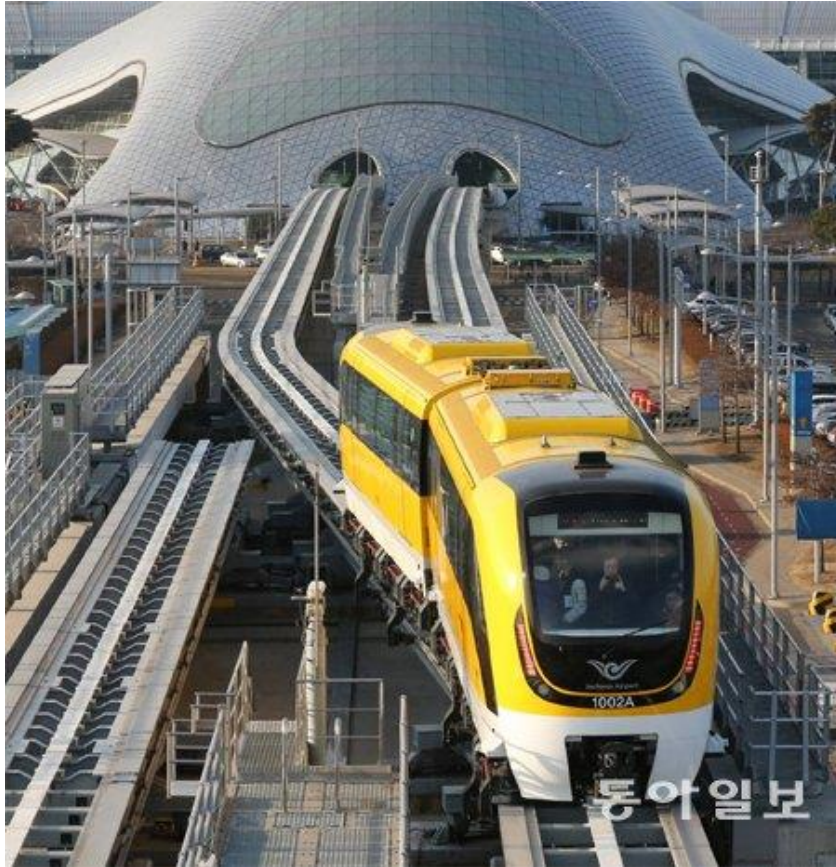


SML x EML (Railroad Switch)



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SML x EML (Railroad Switch)





Thanks for your attention!

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