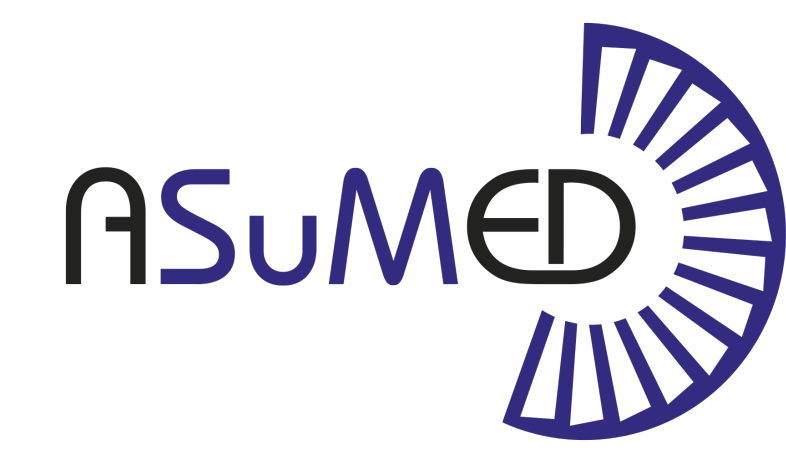


# AC loss in REBCO stator windings of superconducting motors for electric and hybrid aircrafts



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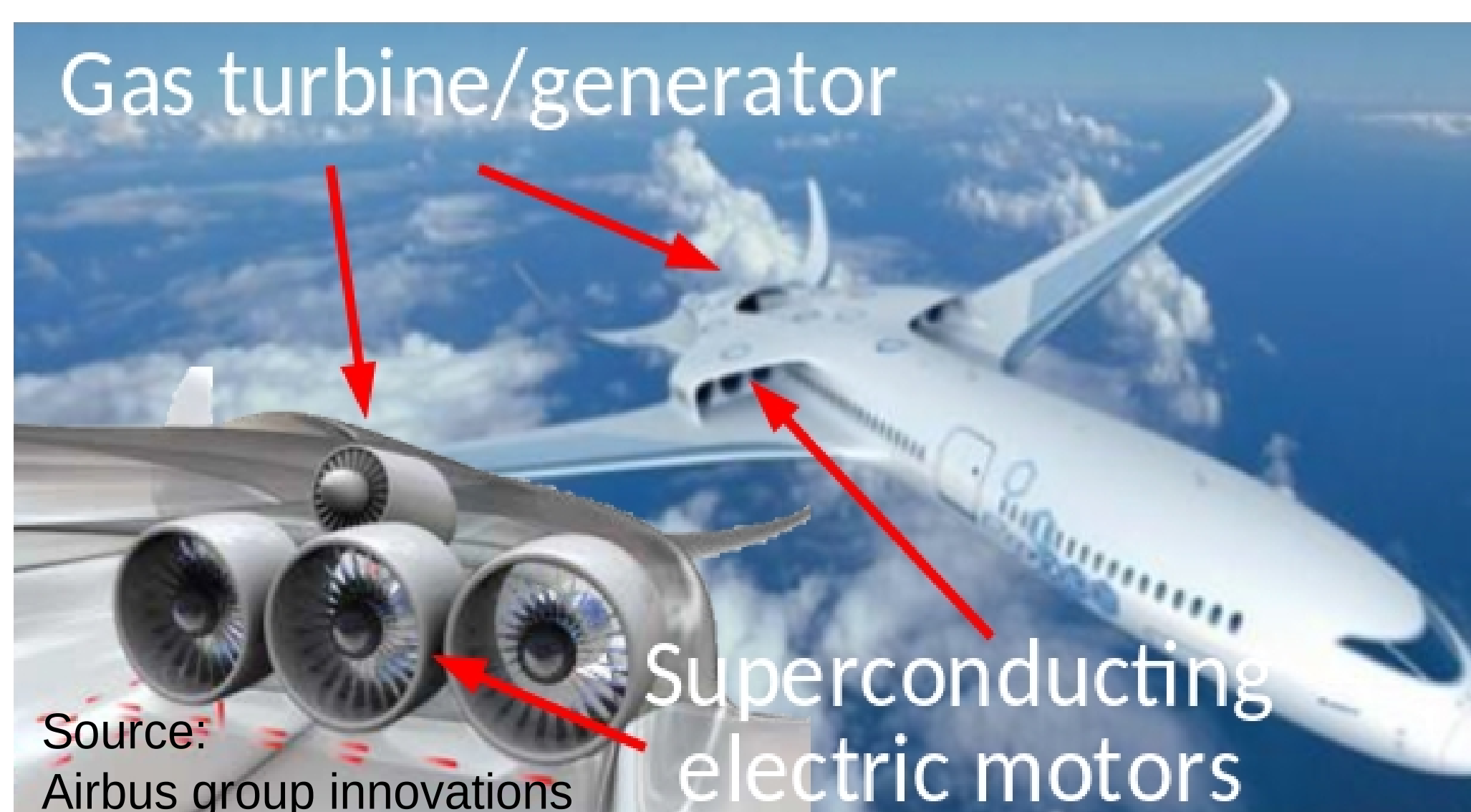
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<sup>2</sup>Karlsruhe Institute of Technology

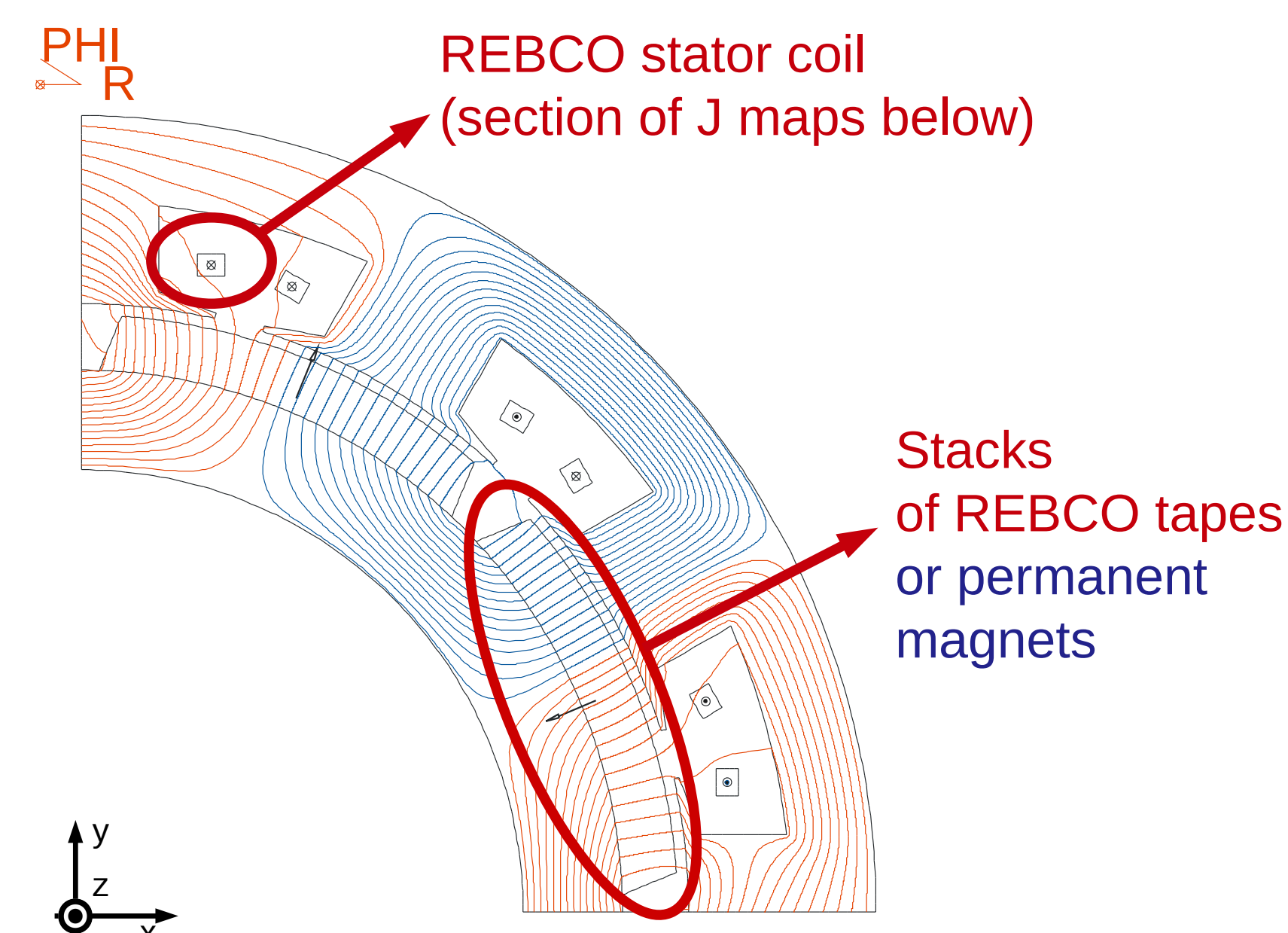
<sup>3</sup>OSWALD Elektromotoren GmbH



## Electric and hybrid airplanes will reduce emissions



## Light powerful superconducting motors



Qualitative sketch

Goals:  
1 MW  
20 kW/kg

## AC loss modeling method

Assume  $J$  uniform in stator coils → Compute **vector potential** by COMSOL → Remove contribution from all coils and calculate **actual  $J$  and AC loss** by MEMEP  
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### Models take into account

#### Interaction between $J$ in each stator coil and:

All other superconducting coils and their magnetization currents  
All iron parts  
Rotor

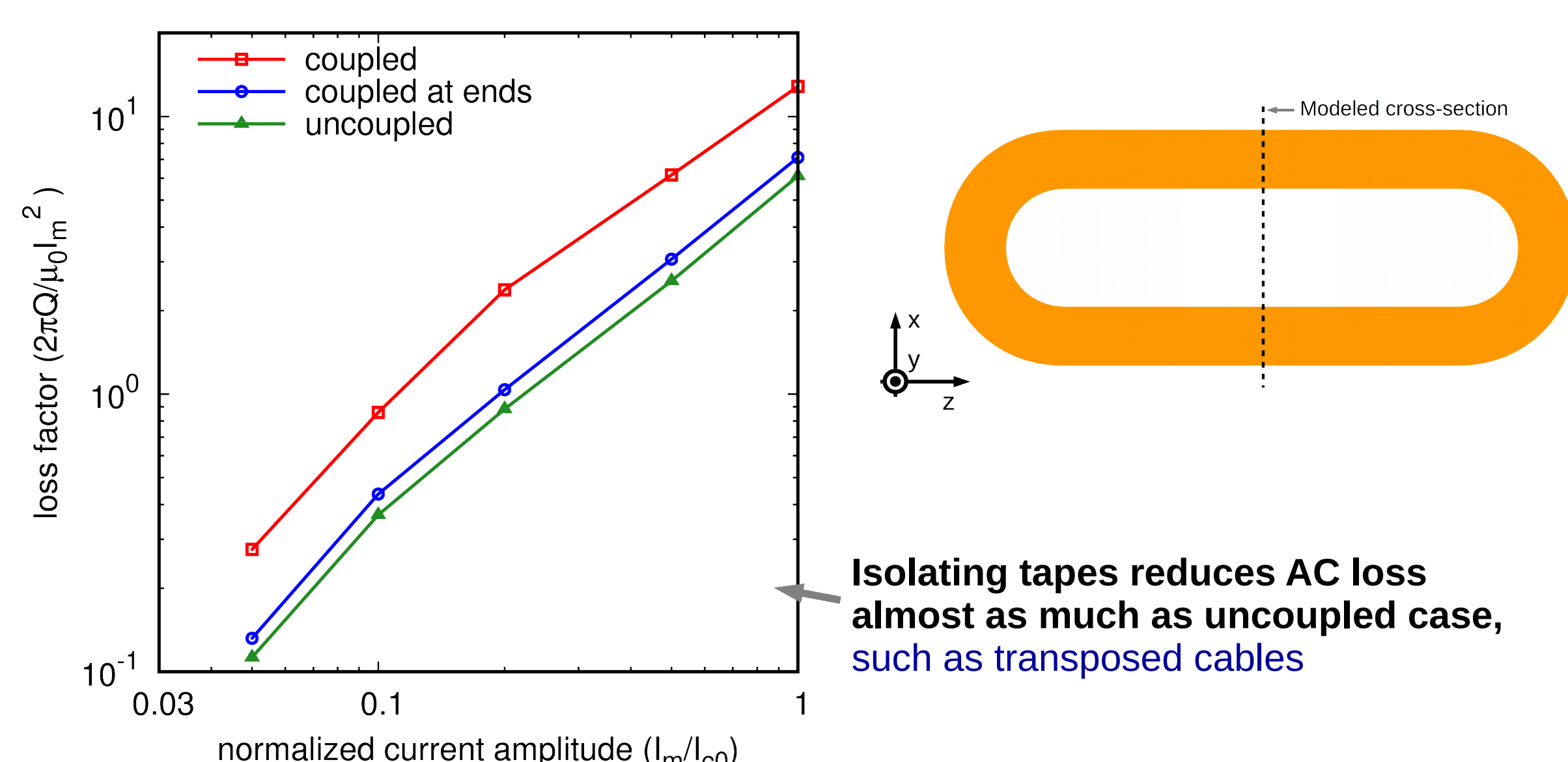
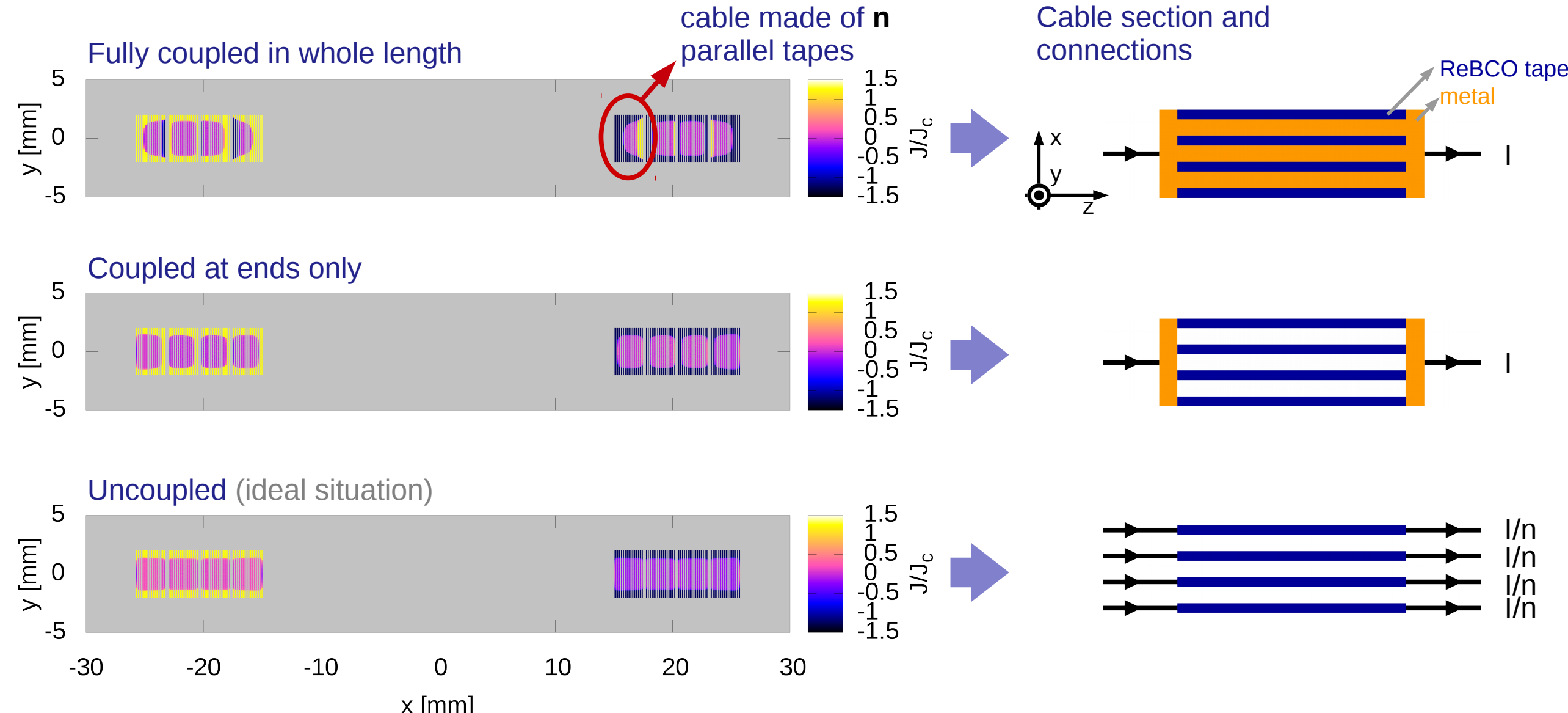
### Models do not take into account

#### Interaction between magnetization currents and iron

Valid for sufficient distance between coils and iron

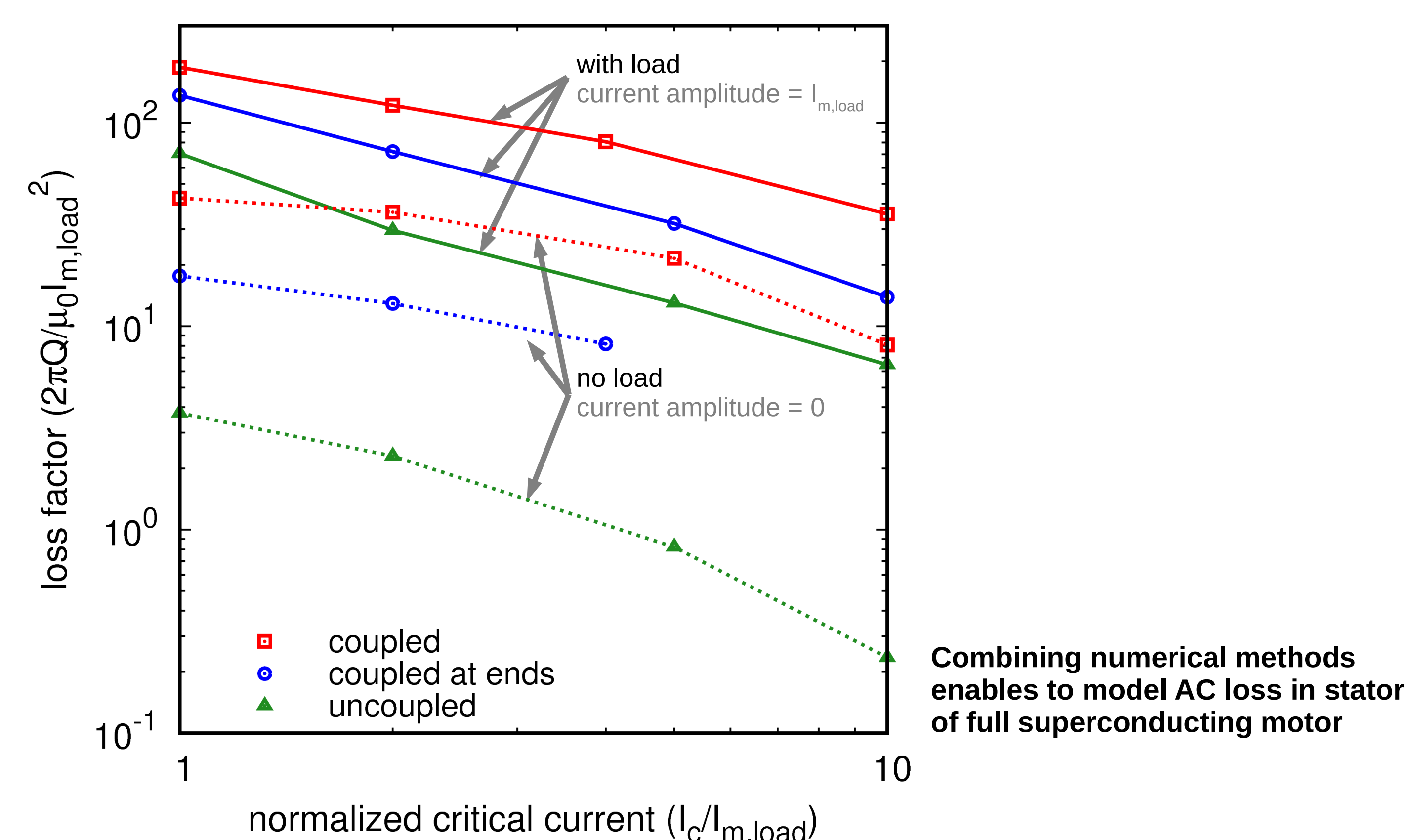
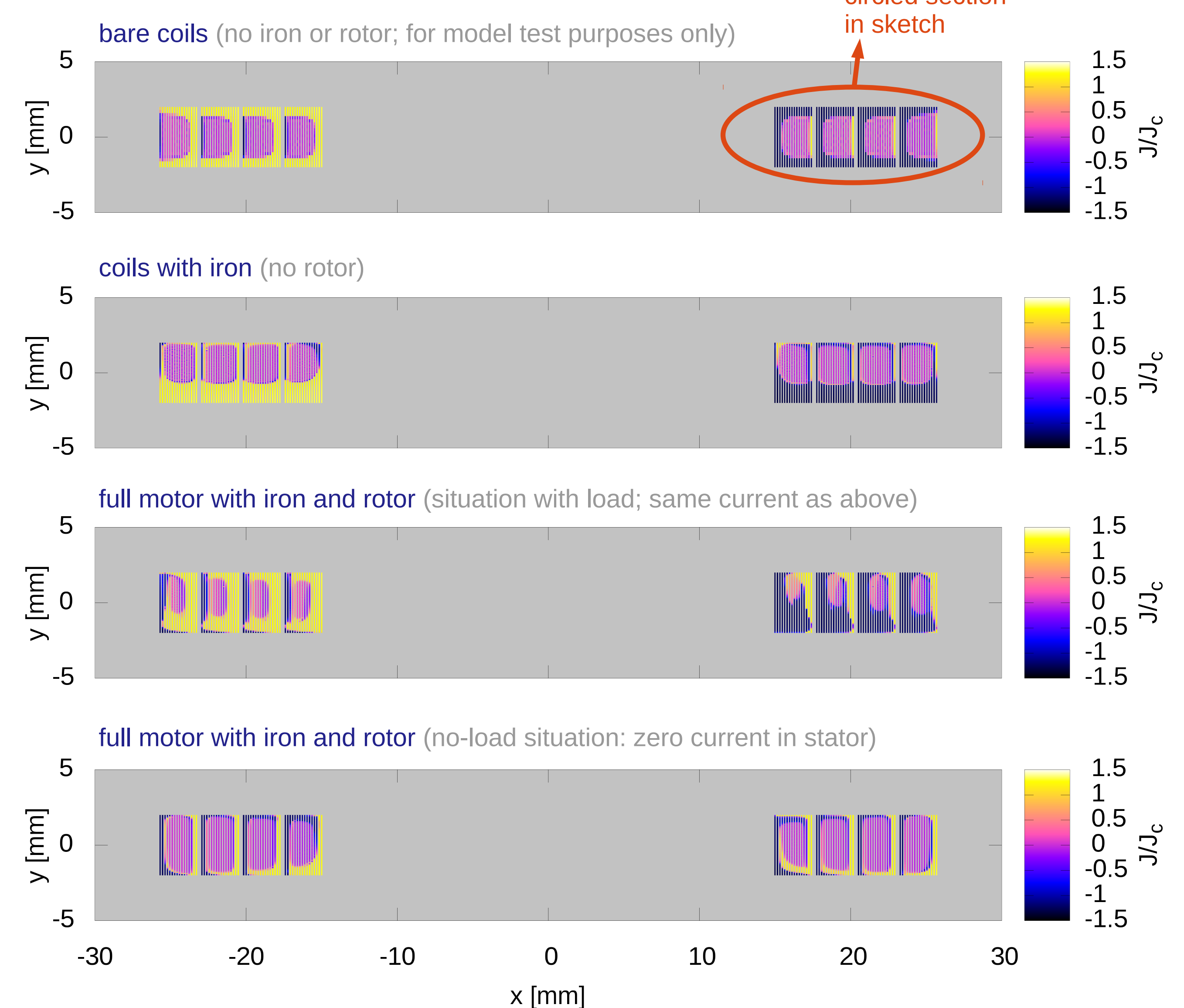
## Stand-alone coil

### Three coupling situations



## Coils in motor

### Tapes coupled at ends



Horizon 2020 project ASuMED partners (<http://asumed.oswald.de>):



EUCAS 2017, Geneva

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