KIT
Karlsruhe Institute of Technology

IBPT
Institute for Beam Physics and Technology

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Controls Group (KIT)

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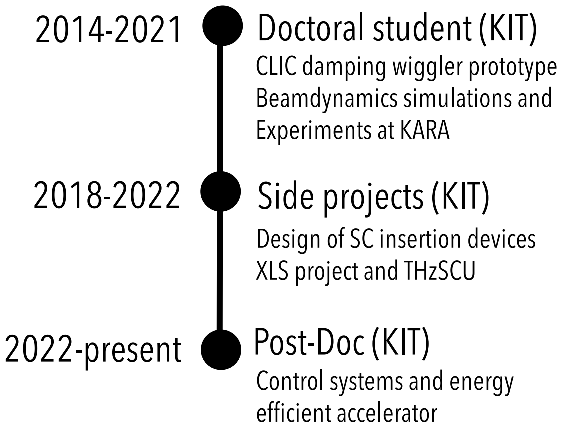


2014-2021 Doctoral student (KIT)
CLIC damping wiggler prototype
Beamdynamics simulations and
Experiments at KARA

2018-2022 Side projects (KIT)
Design of SC insertion devices
XLS project and THzSCU

2022-present Post-Doc (KIT)
Control systems and energy
efficient accelerator

I'm interested in:

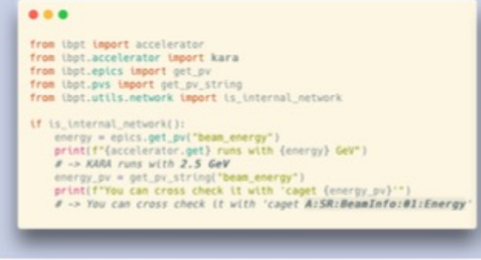
- Integration of ML into accelerator related topics
- Data engineering
- Power consumption optimisation
- Utilising RL for cooling plant optimisation
- (Ethics of ML/AI)

Possible future projects with RL advantages:

- Integrate the thermal wells into our cooling system
- Adjust the cooling system to external factors (weather, beam time / operation mode, …)
- Support my colleagues with their RL projects

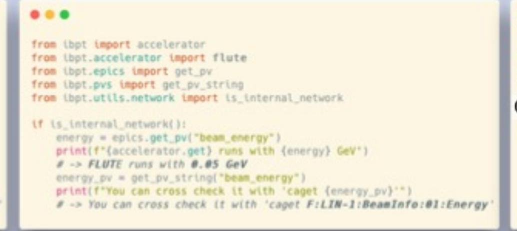
Approach: Wrap accelerator specific interfaces with coherent, accessible and maintainable Python libraries.

Simple Python wrapper



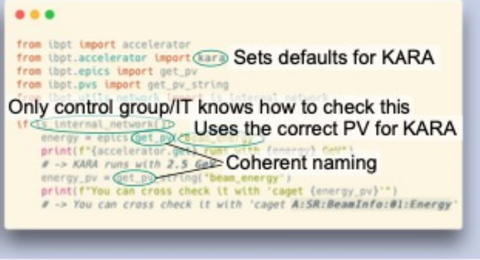
```python
from ibpt import accelerator
from ibpt.accelerator import kara
from ibpt.epics import get_pv
from ibpt.pvs import get_pv_string
from ibpt.utils.network import is_internal_network

if is_internal_network():
    energy = epics.get_pv("beam_energy")
    print(f"{accelerator.get} runs with {energy} GeV")
    # -> KARA runs with 2.5 GeV
    energy_pv = get_pv_string("beam_energy")
    print(f"You can cross check it with 'caget {energy_pv}'")
    # -> You can cross check it with 'caget A:SR:BeamInfo:01:Energy'
```



```python
from ibpt import accelerator
from ibpt.accelerator import flute
from ibpt.epics import get_pv
from ibpt.pvs import get_pv_string
from ibpt.utils.network import is_internal_network

if is_internal_network():
    energy = epics.get_pv("beam_energy")
    print(f"{accelerator.get} runs with {energy} GeV")
    # -> FLUTE runs with 0.05 GeV
    energy_pv = get_pv_string("beam_energy")
    print(f"You can cross check it with 'caget {energy_pv}'")
    # -> You can cross check it with 'caget F:LIN-1:BeamInfo:01:Energy'
```



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```

Sets defaults for KARA
Only control group/IT knows how to check this
Uses the correct PV for KARA
Coherent naming

IT-Infra.

EPICS cassandra ELOG PostgreSQL MML python™

Accelerators

Ursula Herberger, KIT IBPT, Nov 2017

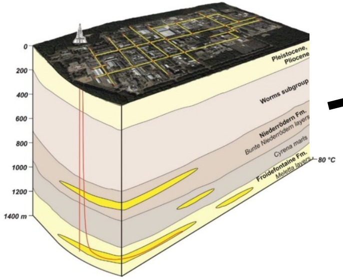
Steffen Schott, KIT IBPT, 2021

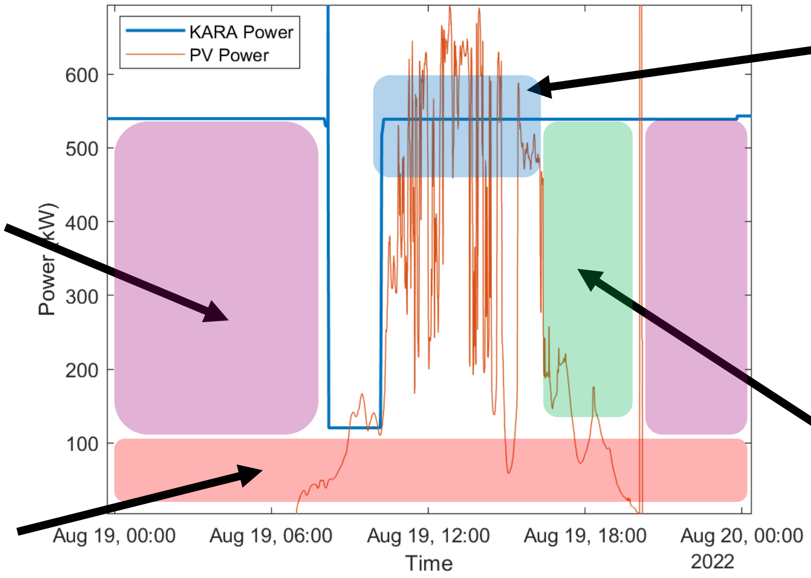
...

Interplay of the sub-systems

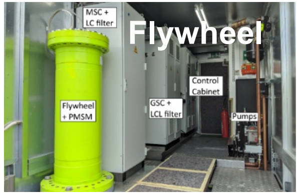
Long-term (>12 hours) storage solutions

Geothermal



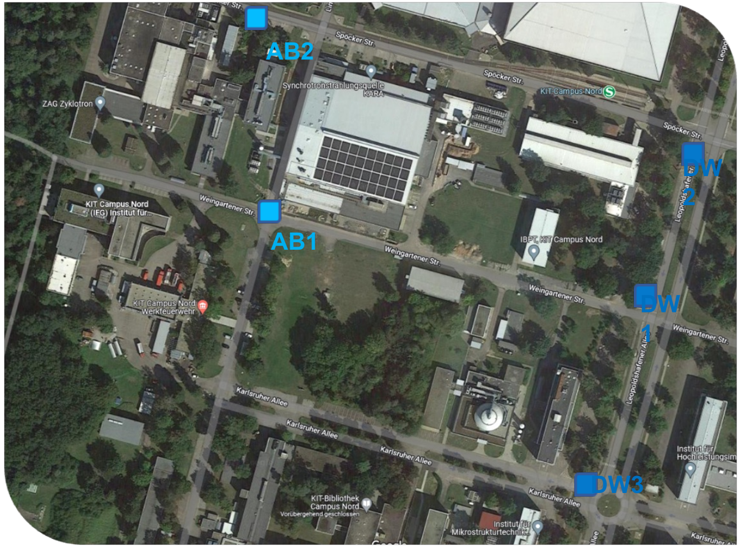


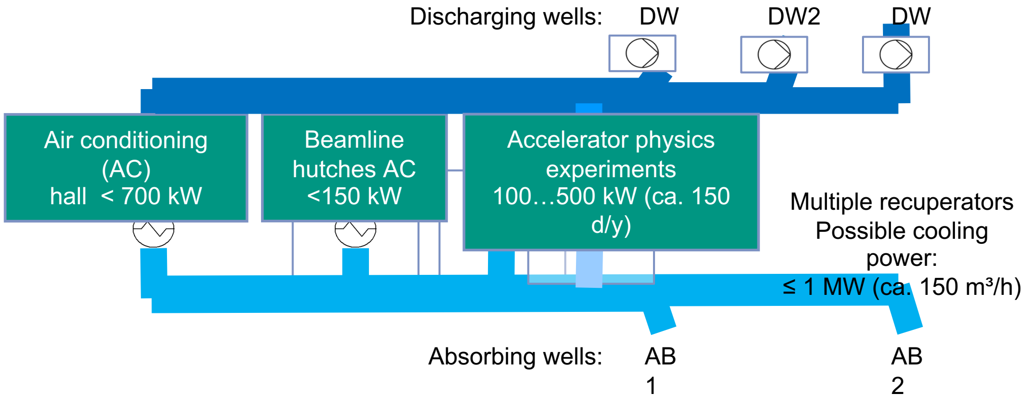
Fast dynamics solutions



Medium-term solutions

Thermal wells


AB2
AB1
DW
2
DW
1
DW3
ZAG Zyklotron
Synchrotronstrahlungsquelle KARA
KIT Campus Nord
KIT Campus Nord (IFG) Institut für...
KIT Campus Nord Werkfeuerwehr
IBPT KIT Campus Nord
Institut für Hochleistungsim...
KIT-Bibliothek Campus Nord
Institut für Mikrostrukturtechnik
Spocker Str.
Weingartener Str.
Karlsruher Allee
Leopoldshafener Allee



Discharging wells: DW DW2 DW

Air conditioning (AC) hall < 700 kW

Beamline hutches AC <150 kW

Accelerator physics experiments 100…500 kW (ca. 150 d/y)

Multiple recuperators
Possible cooling power:
≤ 1 MW (ca. 150 m³/h)

Absorbing wells: AB 1 AB 2