



UNILAC Model

Planning & to do until 2026

■ Magnets

- Standard dipoles, quadrupoles and steerers ✓
 - Source and target dependencies covered by beam path dependent optics
 - Non-multiplexed magnets!
- Solenoids, Octupoles: similar to standard magnets
- TK mode (foil stripper) dependent magnets: special optics ✓
- Sweeper magnets: (=ramped dipoles) + timing supply
- IH tank quadrupoles: special energy/ $B\rho$; simple solution available
- Alvarez MAZ magnets: DC magnets, non-multiplexed!
- Phase advance magnets: parametrised, depend on MAZ!

- RF
 - Settings (amplitude, phase, pulse/pause) in init beam processes ✓ (no model)
 - Cavities: derive settings from final beam energy of section (HLI, HSI, Poststripper)!
 - Buncher: as cavities, but source dependent (fixed pulse/pause setting possible?)
 - ERs: fixed settings
 - Phase axis: phase only, fixed settings
- Chopper
 - HSI & HLI, not TK (adopt TK7-Chopper?)
- Stripper
 - Gas stripper!
 - TK foil stripper!
 - Other foil strippers

- Beam device, timing parameter
 - Basics from generic transferline adopted ✓
 - Extensions, e.g. for RF hierarchy, pulse timing
- Fast beam loss monitoring (SVÜ), new SVÜ different?
- Ion sources: Probably not part of the model, but extra source chains?

- Makerules (adopted ✓)!
 - New parameter types needed

- From 2026 or later (FESA):
 - New SVÜ?
 - Beam diagnostics: MAPS, profile grids, trafos/cups? ...

- Devices ✓
- Elements ✓
- Device import
 - Import all devices that need data supply or display in DeviceControl
- Magnet calibration curves
- Accelerator zones ✓
- Particle transfers ✓
- Transferlines ✓
- Timing groups!
- Mapping VirtAcc to Chain

■ Optics

- Standard ✓
- TK mode ✓
- Parametrised, MAZ dependent for phase advance magnets!
- Later
 - Beam current dependency (HSI)
 - IH tank quadrupoles?

■ Beam processes, chains

- Beam process types: Standard, others needed? ✓
- Init beam processes: RF settings ✓
- Basic chains ✓
- Template chains: generation by Scheduling App as for HEST ✓
 - Naming of chains with identical transferline

- Event sequences per chain
 - Fixed event list
 - Operational boundary conditions from non-multiplexed sources
- Overall schedule containing all chains!
 - Algorithm: mimic UNILAC Pulszentrale planning
 - Input from SIS/FAIR schedule(s) and UNILAC users and requirements
- Timing graph generation?
- Monitoring
 - Max. 5Hz for HSI, QQ magnets, Brho-limit TK3 chicane (?), and others

- Reset chain to initial (theory) settings
- Copy settings from one (optimised) chain to another
- Non multiplexed devices
 - Global parameters for many chains → Accelerator device?
 - Alvarez MAZ magnets
 - Phase advance magnets depend on MAZ magnets setting
 - Strippers
 - Sources: ion, timing
 - Synchronise settings in chains for DC magnets
 - LEBT, HLI
 - EH branches
- Timing groups mapping to particle transfers
- Standalone chains

- UNILAC model
 - Emergency model complete 2024-07
 - Basic model complete until end of 2024

- Timing
 - Design draft Q3/23
 - First version of PZU algorithm Q1/24

- LSA model / data supply:
 - Source: Source App
 - LEPT: LSA
- Source App
 - Advanced development, in operational use
 - Stand alone trial 2024, stand alone operation 2025
 - Independent from new CS, FESA compatible
- Timing / arrangement
 - Separated timing, e.g. as one chain per source, timing parameters entangled with UNILAC chains
 - How to allocate source, LEPT and following UNILAC into chain(s), propagate settings?
- Source teststands
 - Timing: Similar to UNILAC sources, additional timing group/chain, independent from UNILAC
 - LSA model for teststand beamlines
 - Operational independently from UNILAC → testbed vor controls development