



ARENA+ in ITM

**Gergely Csépany¹, Gergely Papp^{1,2}, Gergo Pokol¹,
Tünde Fülöp², Jakob Rydén²**

¹Institute of Nuclear Techniques, Budapest University of Technology and Economics,
Association EURATOM/HAS

²Nuclear Engineering, Department of Applied Physics, Chalmers University of
Technology, Association EURATOM-VR

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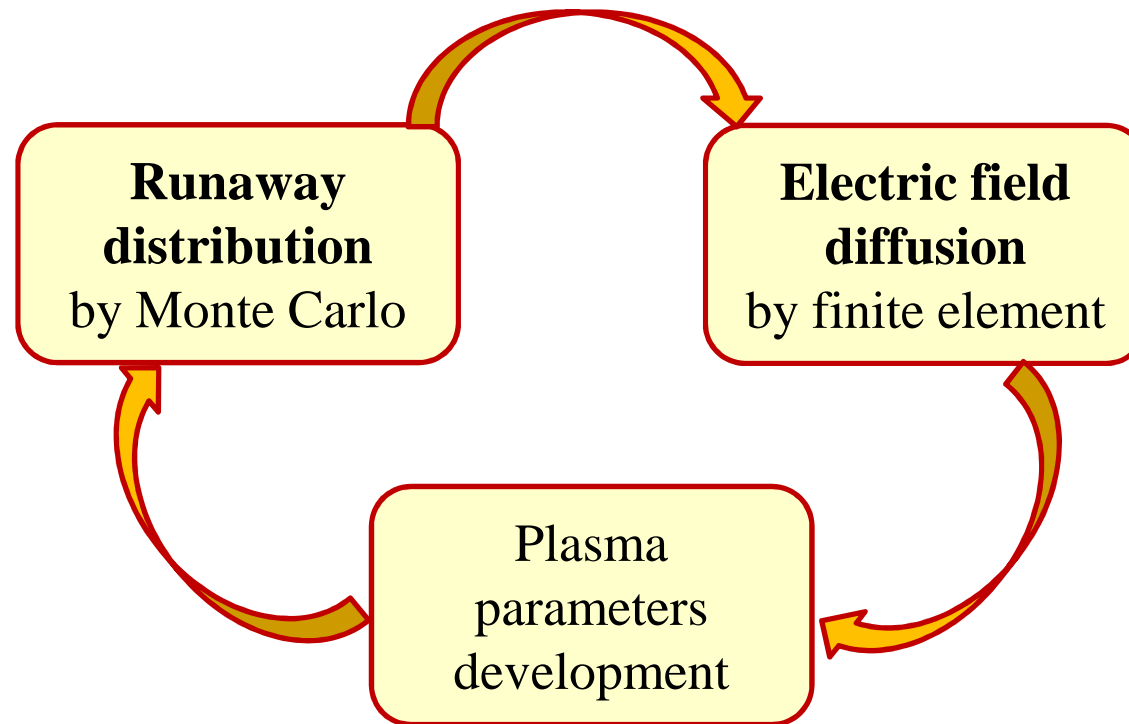


ARENA+ introduction

Analysis of **R**unaway **E**lectrons by **N**umerical **A**lgorithms (**ARENA**)

Originally developed by L.-G. Eriksson and P. Helander in 1998-2004

1+2 D code





ARENA integration to ITM



Planned for 2011

Phase I

- (A) porting to the ITM Gateway – **completed**
- (B) grant of software license and rights to the ITM-TF – **delayed**
- (C) project under GForge and code under subversion – **completed**

Phase II

- (D) conversion into a module using CPOs – **in progress**
- (E) conversion of code specific input to XML – **completed**
- (F) creation of standalone wrapper for testing – **in progress** (Python)
- (G) provision of standard test cases – **completed**
- (H) standardized build procedure (make) – **completed**
- (I) standardized test procedure – **planned**

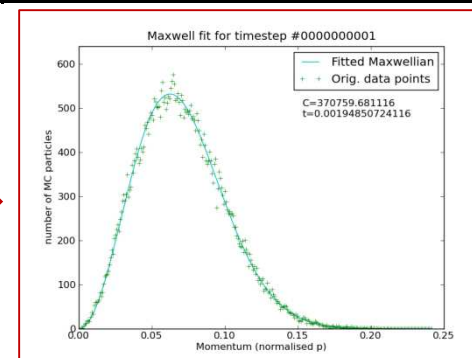
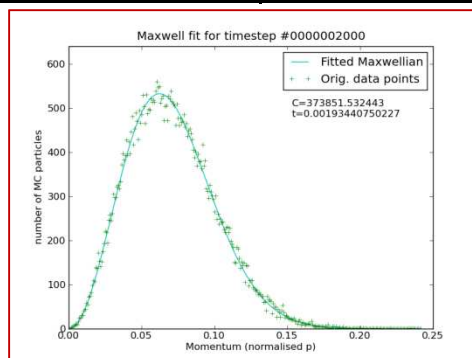
Phase IV (documentation)

- (N) code documentation (for developers and maintainers) – **in progress**




Major activities

	ARENA (original)	ARENA+
Code cleaning	20355 lines of code	7055 lines of code
	Mixed F77 - F90	F90 + Python wrappers
	Implicit typing	Fully explicit
	Common blocks	Modules
	Not optimized for speed	4x fast with Intel compiler
Documentation	Scarce comments	181 pages of Doxygen doc
Testing	Maxwell preserving	successful
	Dreicer generation	problems
	Avalanche generation	planned





Further plans with ARENA+

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1. **Correct code** to satisfy the test cases (intense communication with original developers)
 1. Standardized test procedure
 2. Change **time base** to absolute units instead of collision time normalized
 3. Proceed with **Kepler actor** production
 4. **Physics enhancement**
 1. New collision operator
 2. Generalized plasma parameter evolution
 3. Hot tail generation
 4. Generalized geometry
 5. ...
 5. **Physics utilization**
 1. Validation
 2. ITER predictions
 6. **Separate** Monte Carlo (runaway) and finite element (E field) part ?
 7. **Parallelization ?**