

Tuning Tools:



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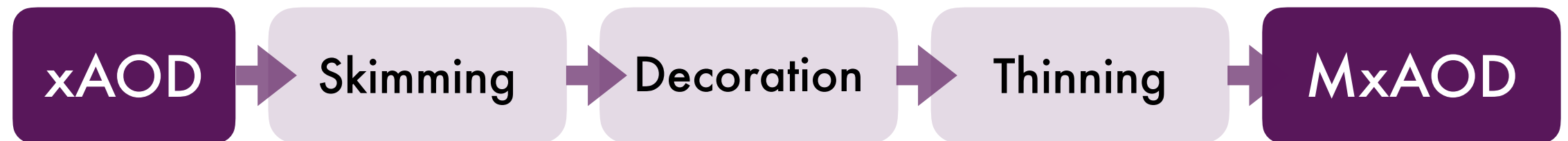
Outline

I. Overview of THOR and loki

II. Towards new tunings

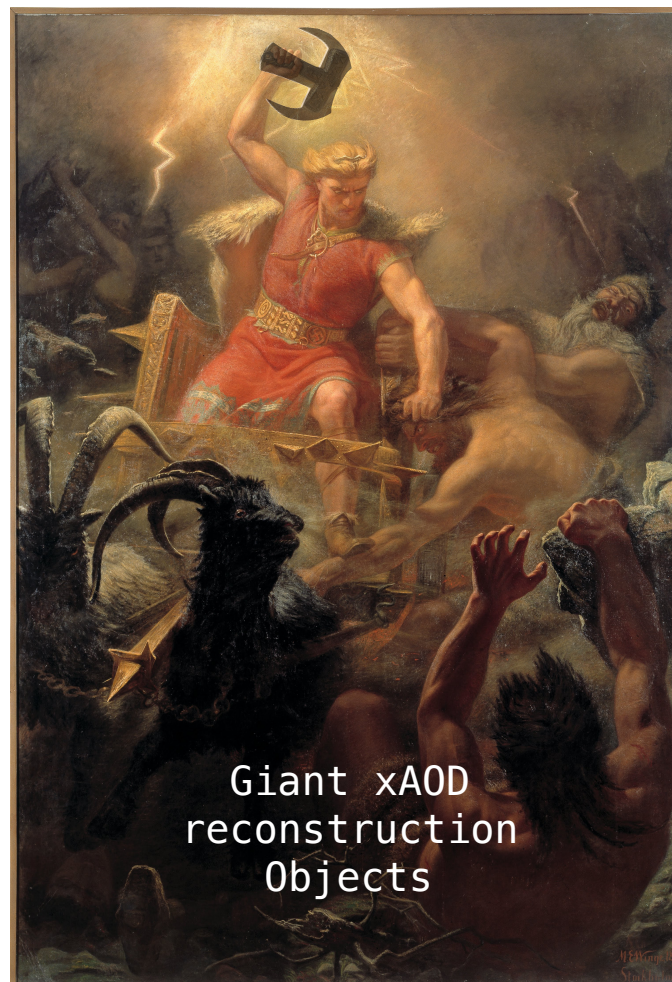
What is THOR?

Crush xAODs/DxAODs into Mini xAODs. Based on EventLoop



InDet, Truth, Trig, PF0,
CaloTopo, egamma, tau, Jet,
Calo, MET, BTag, Muon, ...

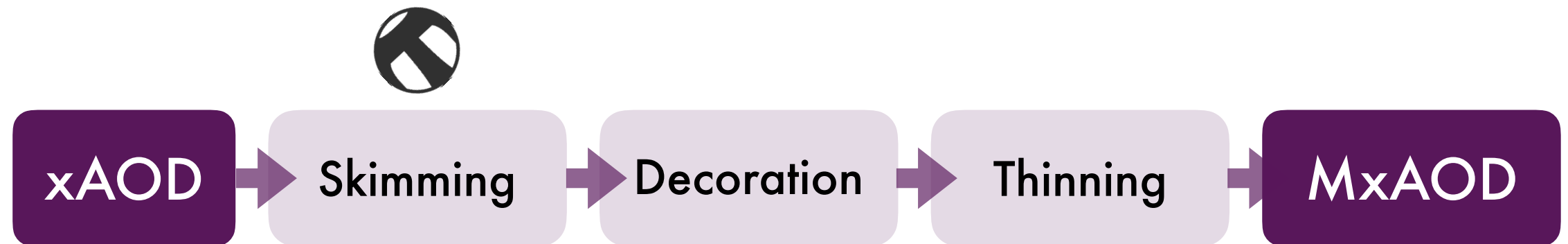
TauJets, TauTracks,
PF0s, DiTauJets, ...



Thor's Fight with the (xAOD) Giants (1872) by Mårten Eskil Winge.

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THOR

- Wrap **selection tools and truth matching tools** in TauAnalysisTool
- **Select the taus** that go into further processing
- User can **configure SelectionTool and TauTruthMatchingTool**
- User can **define new selection tools**

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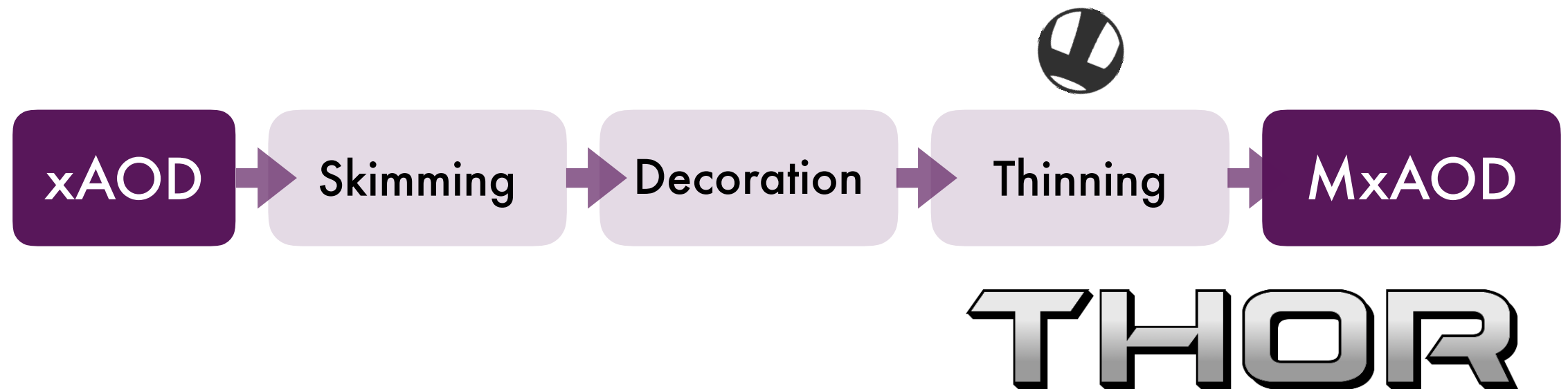


tauRecTools/tauRecToolsDev

- Tools inherit from TauRecToolBase
- Run reconstruction and identification tools: [Tracking](#), [Pantau](#), [ID](#), [TES](#), ...
- Run Variable Calculators: [decorate new variables](#)
- All tools are processed by TauProcessorTool
- User can test their new algorithms and decorators in [tauRecToolsDev](#)
- Afterwards [easy to migrate to tauRecTools](#)

What is THOR?

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🌐 Thinning, Slimming:

- ★ Record only the containers you need
- ★ Store only the variables you want

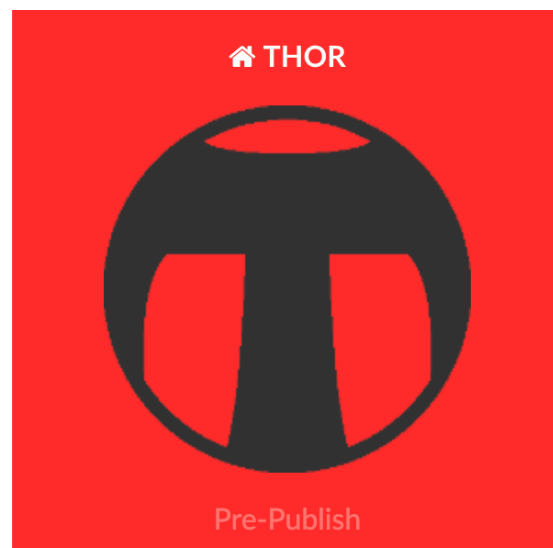
🌐 **According to user's project:** relevant Stream and job options

What is new in THOR

- Support for boosted DiTau Objects
- RNN (TauID, Tracking, Decay Mode) Decorators/Evaluators
- Event-based SelectionTool: for Tag and Probe study
- HL-LHC samples compatibility

What is new in THOR

- 🌐 Complete CI pipeline:
 - ★ Build: set up and compile
 - ★ RTT: produce MxAOD with StreamMain
 - ★ Plot: install loki, make standard TaulD and TES plots
 - ★ deploy: publish sphinx documentation.
- 🌐 New Documentation: (under construction)
 - ★ Up-to-date guides and more elaborate tutorials



[Docs](#) » Welcome to THOR's documentation!

THOR

[Support](#) | [Tracker](#) | [Git](#) |

Welcome to THOR's documentation!

Click on the image, check the new docs and let us know your feedback!

Status and future

User experience:

- Fairly easy to setup and run
- Core functionalities are stable
- Continuous maintenance/support
- Lack of documentation (e.g. which job option related to which study)

Problems:

- Inconsistent container skimming between TauJets and other containers, broken ElementLinks in MxAOD
- Proposed solution: THOR takes care of copying only objects from selected containers still associated with TauJets
- MxAODs are still not fully functional AODs



Future: Implement THOR based on Athena / AnaAnalysis

Goal: Making MxAOD perfectly working AOD!

What is loki?

Lots Of Kewl Images and algorithm training. Based on ROOT/python.

MxAOD

- User define/use predefined
Samples Vars Cuts Styles ...
- Translate into RootDrawables

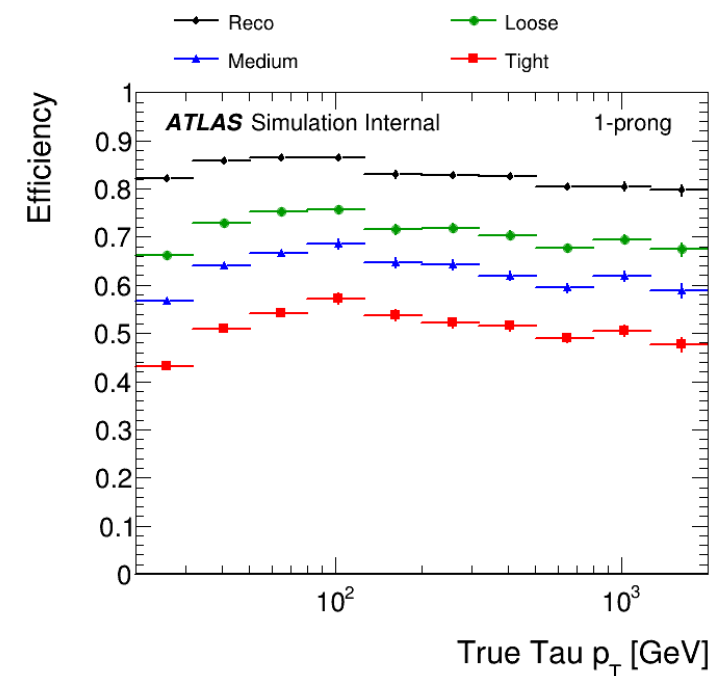
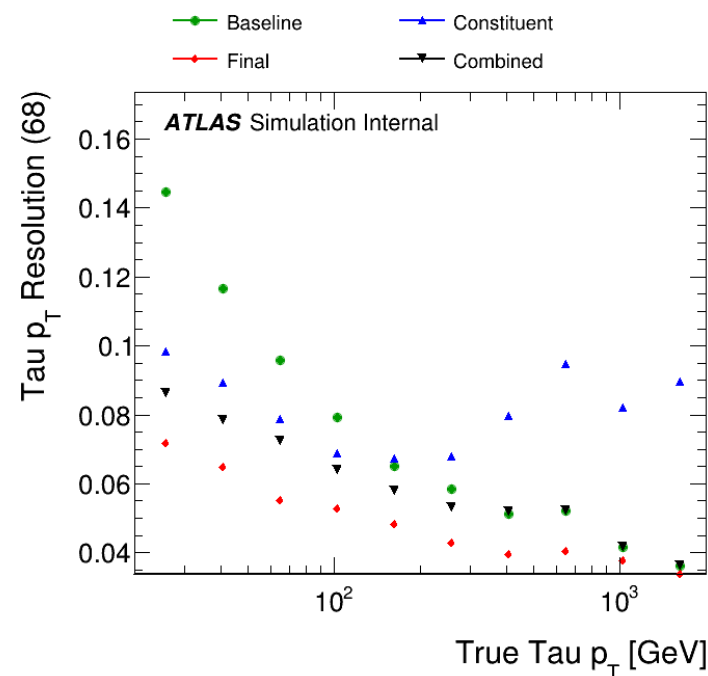


processes the plotting ...

Reco Tau Decay Mode	ATLAS Simulation Internal				
	1p0n	1p1n	1pXn	3p0n	3pXn
3pXn	0.2	1.0	1.4	6.7	62.5
3p0n	0.6	0.4	0.3	85.7	27.4
1pXn	2.8	11.1	39.0	1.1	2.8
1p1n	19.3	70.4	46.2	3.2	4.9
1p0n	77.1	17.1	13.1	3.3	2.5

Diagonal: 66.4% Efficiency

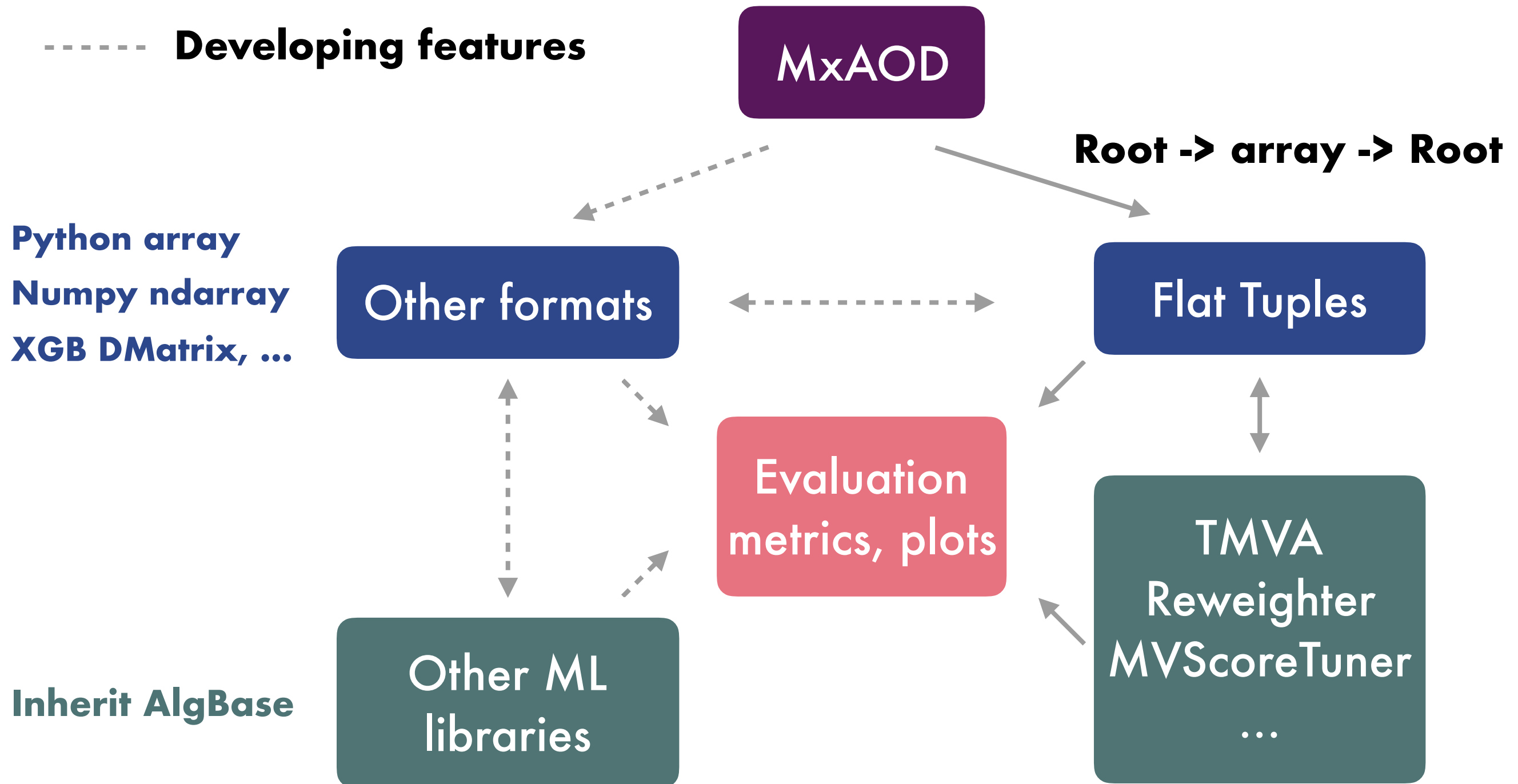
True Tau Decay Mode



What is loki?

Lots Of Kewl Images and **algorithm training**. Based on ROOT/python.

----- Developing features



User experience

Friendly Command line:

- Standard and quick plots
- Pdf and html plotbook
- Flat ntuple processing, MVA training and evaluation

Flexible Extension:

- Use loki as a library in own scripts
- Compatible with 3rd party libraries, pip install them in dev mode

Defect in design:

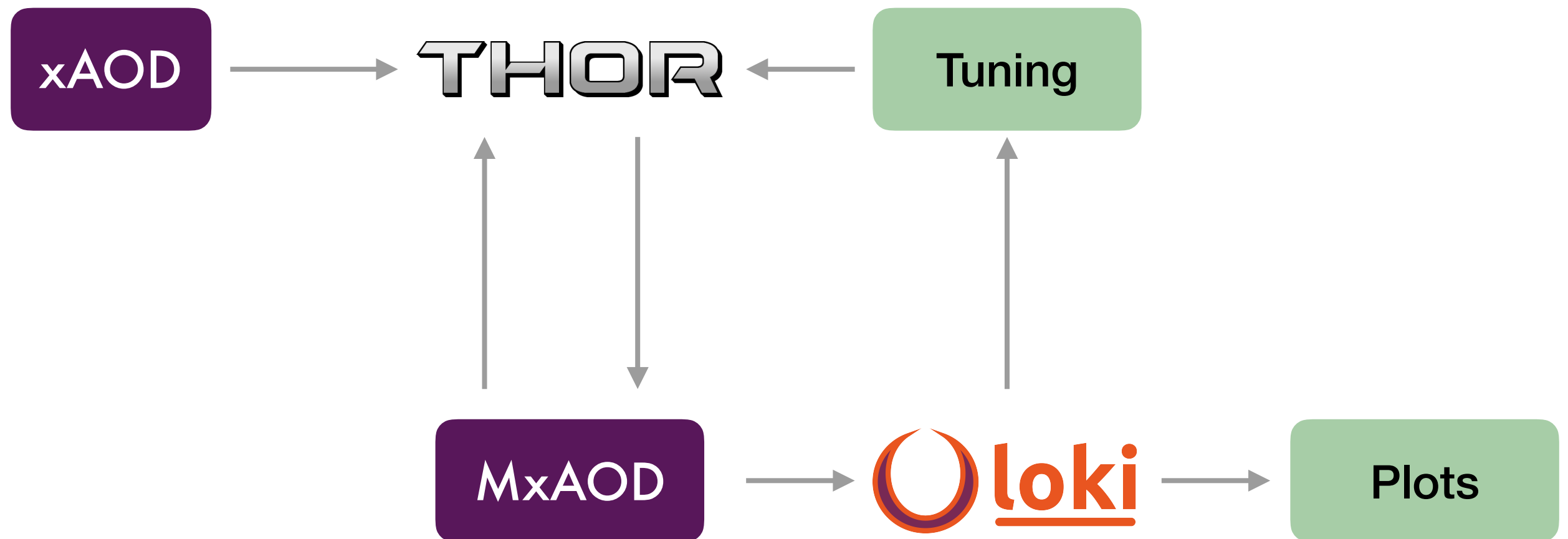
- Doesn't support vector variables
- Doesn't support multiple multi-value containers work together

Want for the future:

- all algorithms integrated (including TES even DiTau?)
- python3 in the long term?
- A lot more new features to explore, but limit manpower (no loki maintainers)



The workflow of THOR/loki

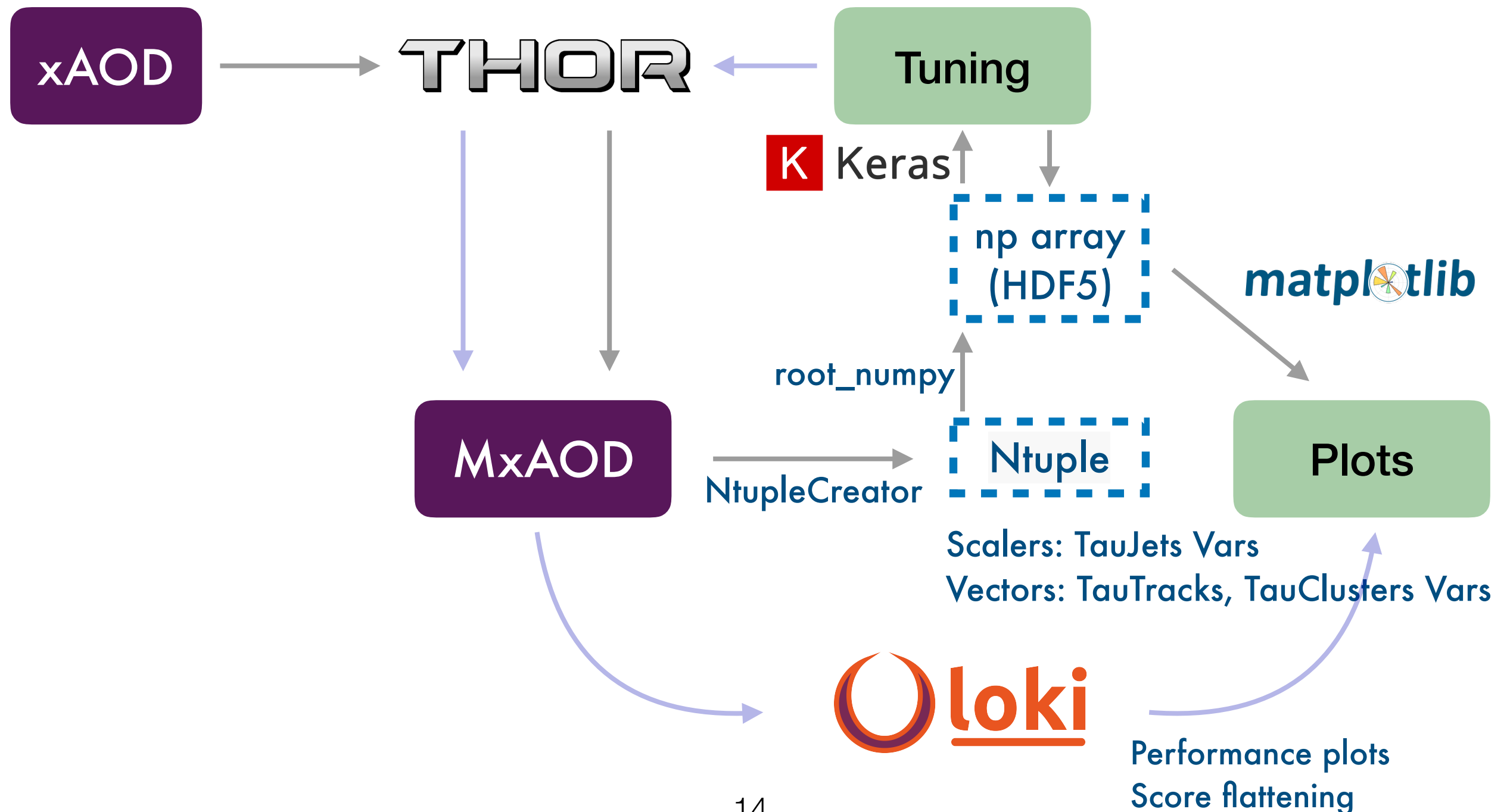


New tunings?

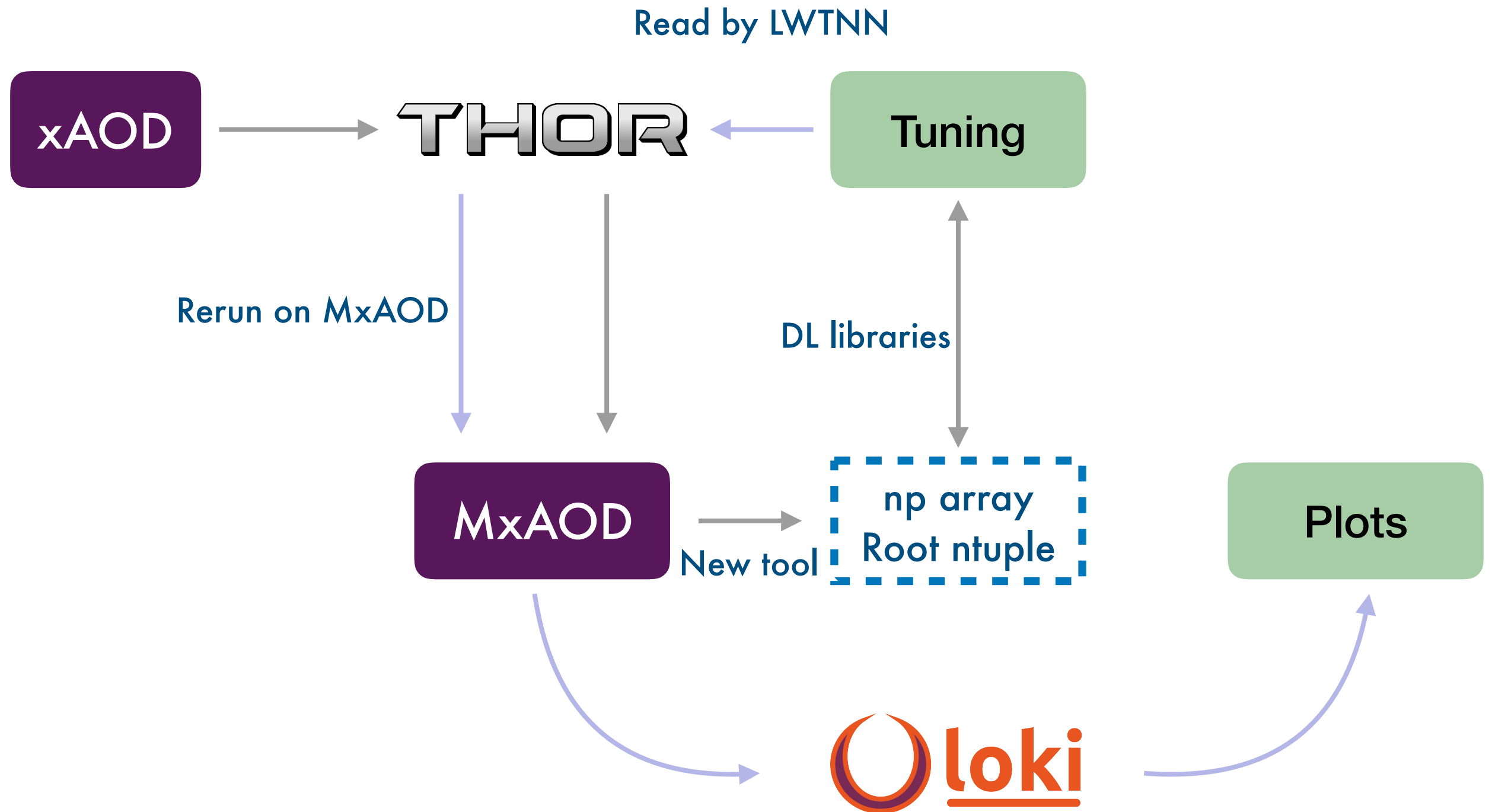
New tuning: RNN ID/DecayMode

1. Create a json file that includes variable specifications , network structure and weights, using LWTNN

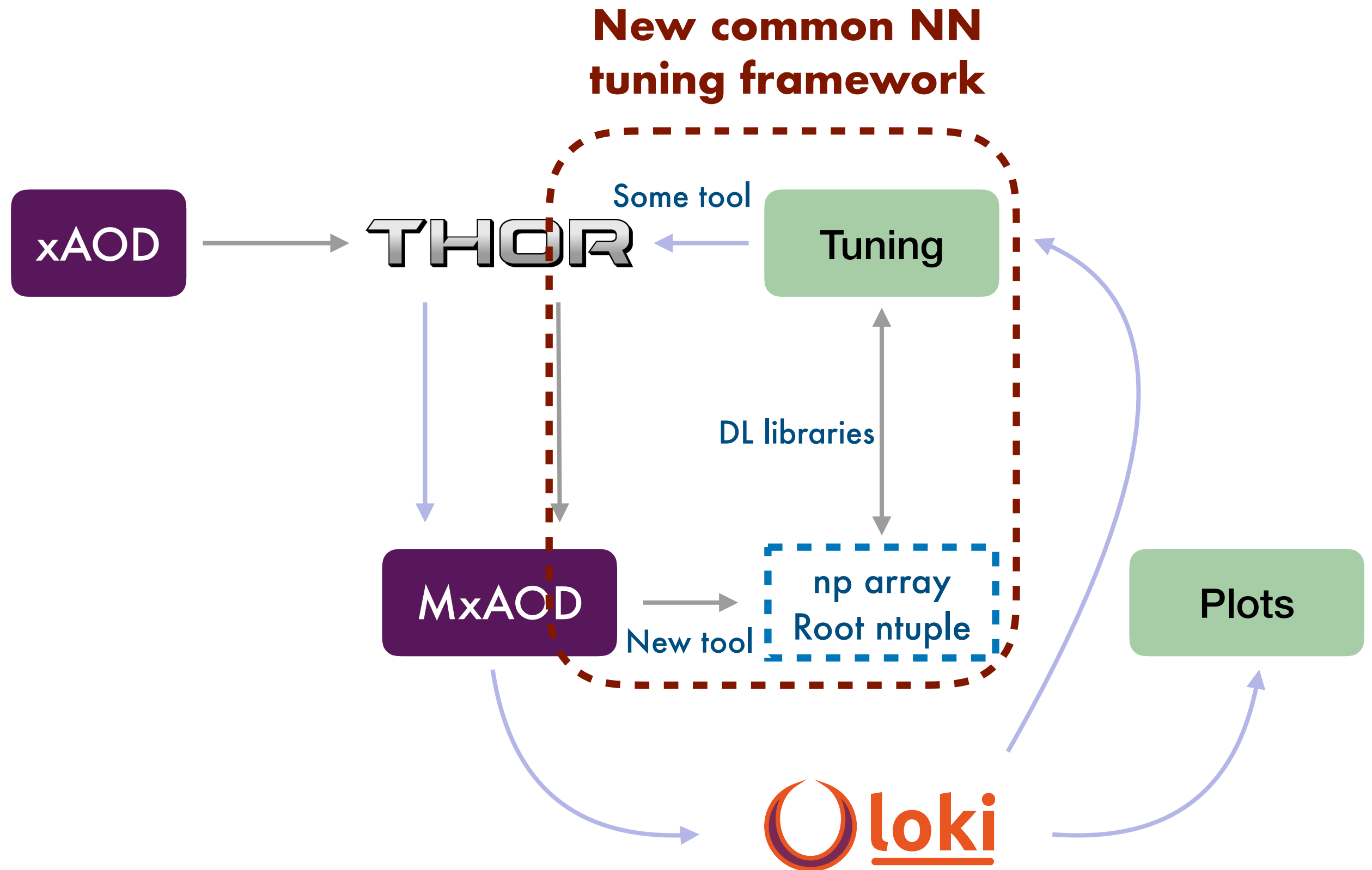
2. Read by LWTNN in tauRecTools



New tuning: RNN Tracking



New workflow



Future of tuning tools (proposal)

THOR:

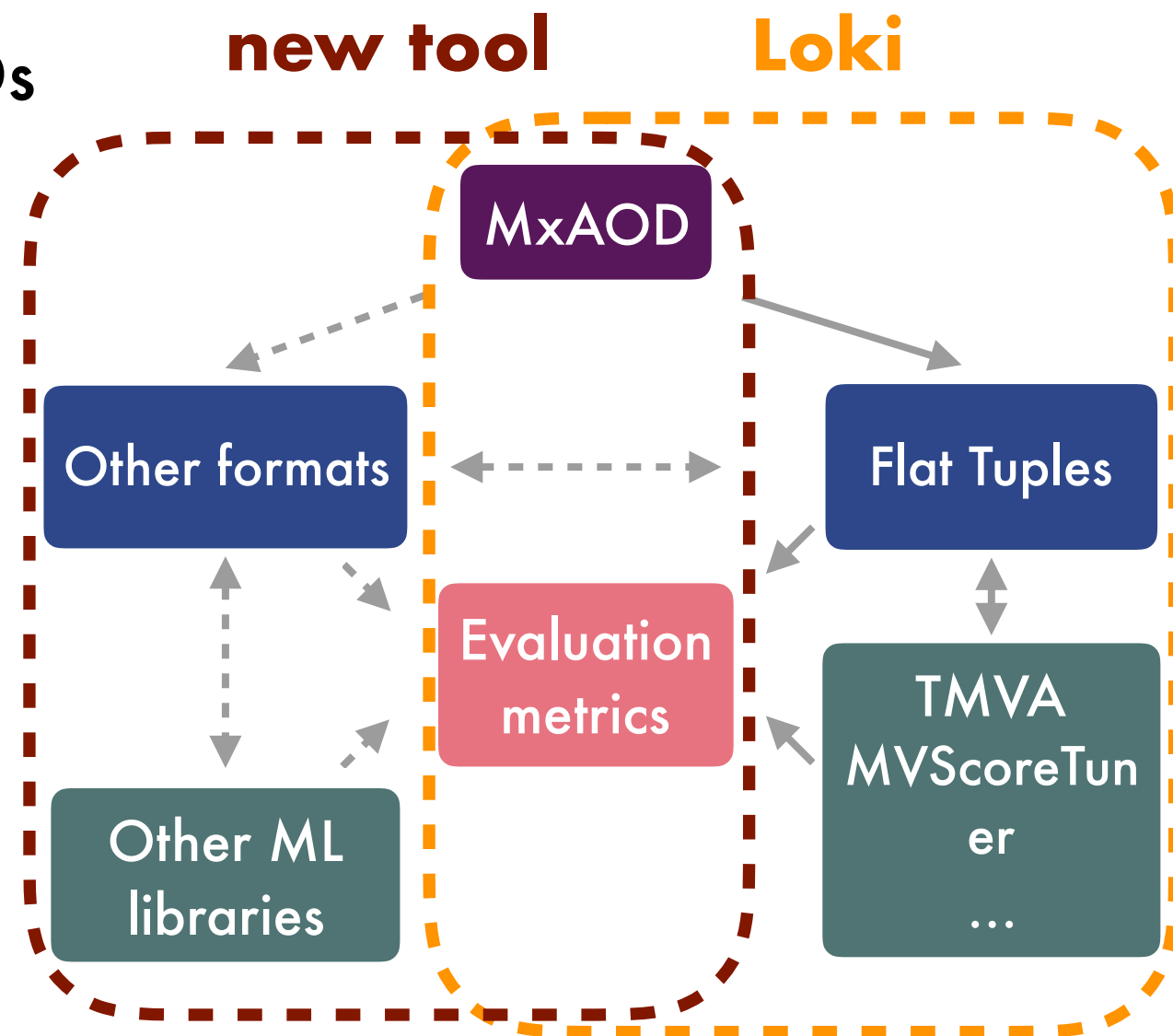
- ★ Switch to Athena-based
- ★ Make perfectly functional MxAODs
- ★ MxAODs can be rerun on THOR

Loki:

- ★ Add new features if needed
- ★ Make standard performance plots
- ★ Make full use of ROOT (TMVA)

A new tool:

- ★ ML data processing
- ★ ML algorithm training
- ★ Common framework for NN tuning



Thanks for listening!



ATLAS
EXPERIMENT