

HSF/JENAS: points on common challenges and needs

Preparation for

<https://jenas-2019.lal.in2p3.fr/hep-software-foundation-meeting/>

How to fill this document: Your idea goes here

Free-text or bullet points:

- scientific case
- software and computing needs from your community
- ideas for cross-collaborations
- ...

High energy physics

See presentation by Graeme Stewart

Astroparticle & neutrino physics

Contributors: Kay [?]

ANTARES/KM3NeT (1)

- **scientific case**
 - neutrino astronomy/astrophysics: point sources and diffuse flux
 - neutrino physics: mass order and beyond
- **software and computing needs from your community**
 - General:
 - mix serial (simulation, data) and multi-parallel (e.g. ML on GPUs) data processing
 - event-like data (as in HEP)
 - PDF-based reconstructions and machine learning (ML)
 - binned and un-binned analyses
 - data formats:
 - ROOT, HDF5, ASCII + databases
 - open high-level data format for open-science data (tbd, base on IVOA standards?)
 - Software:
 - C++ and/or python-based, aim: open software

ANTARES/KM3NeT (2)

- computing needs (for one KM3NeT BuildingBlocks (BB) - KM3NeT will be 3BB; ANTARES needs ~ 15% of this) see also "[Towards a model for computing in European Astroparticle Physics](#)"

KM3NeT Preliminary

processing stage	size per year (TB)	time per year (HS06.h)
Raw Data		
Raw Filtered Data	300	-
Monitoring and Minimum Bias Data	150	-
Experimental Data Processing		
Calibration (incl. Raw Data)	1500	48 M
Reconstructed Data	300	238 M
DST	150	60 M
Simulation Data Processing		
Air showers	50	7 M
atm. Muons	25	638 k
neutrinos	20	220 k
total:	995	353 M

- ideas for cross-collaborations
 - open access data format and framework
 - machine learning developments ("picture-based" data)

Astroparticle & more: ESCAPE

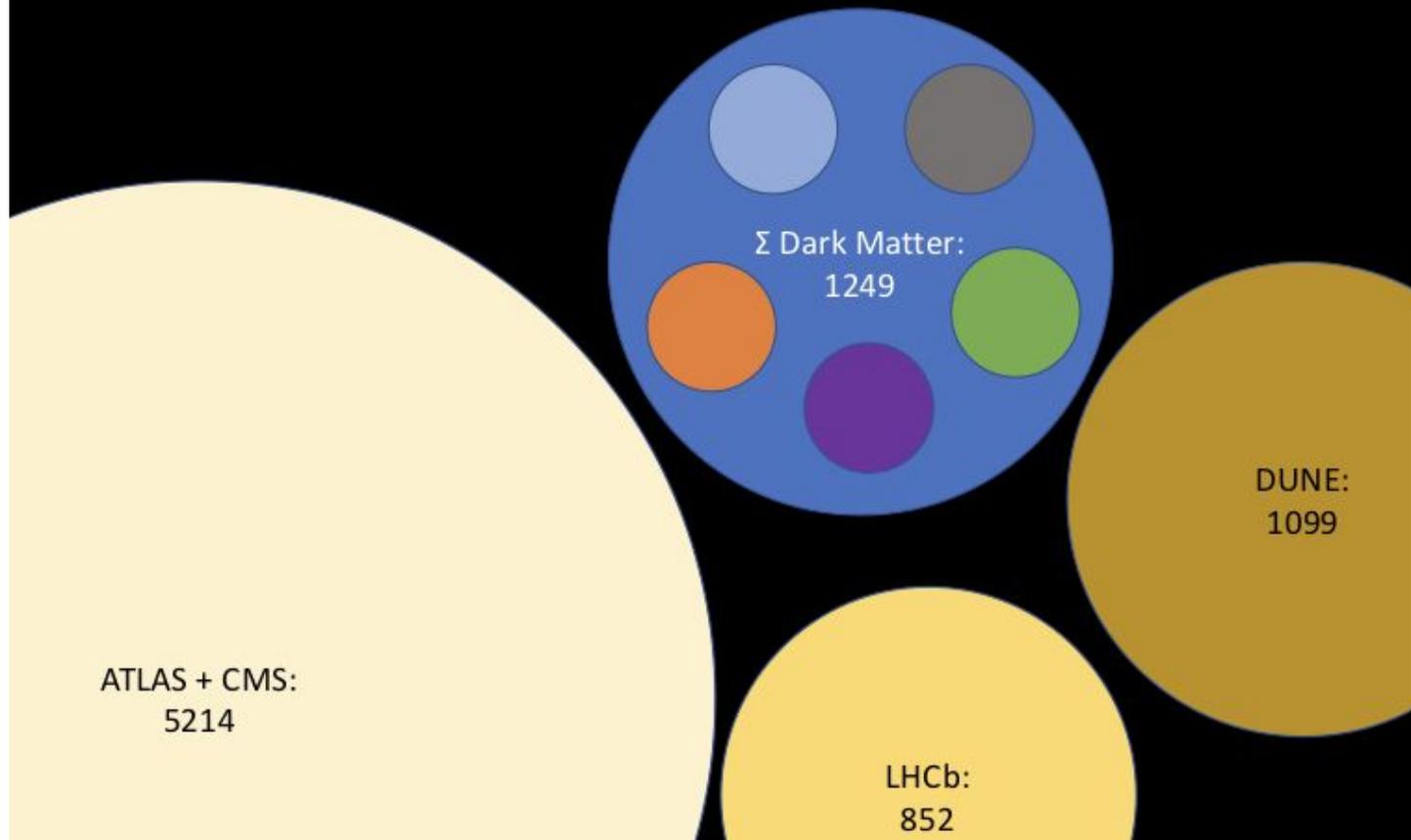
Contributors: Giovanni Lamanna

Astroparticle: dark matter direct detection

Contributors: Chris Tunnell

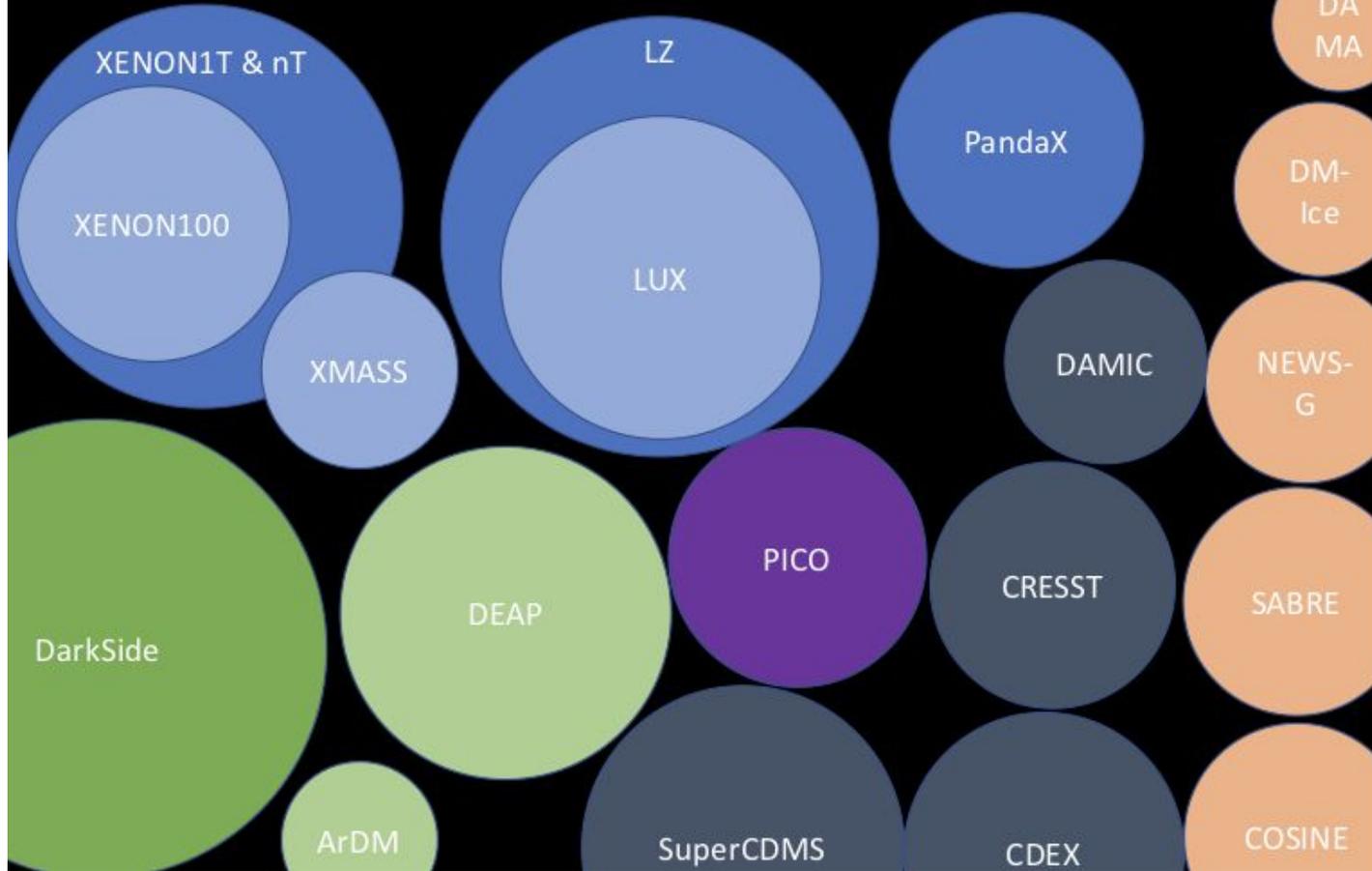
Dark Matter Detection community big

Area corresponds to number of people based on most recent publication from any experiment that has published scientific papers in the last two years. This relied on Inspire-HEP. I almost certainly missed an experiment. Number of authors also does not correspond to FTEs since not all experiments require collaborators be 100% committed to that experiment. See [gist](#) for calculation notes. 16/March/2019



But 1249 Dark Matter users spread out

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Dark matter detectors and medium-scale neutrino experiment (Tunnell on behalf of... self? Informal advocate?)

- Scientific case: Dark matter direct detection and neutrino property physics
 - XENON, SuperCDMS, PandaX, LUX, LZ, DarkSide, DEAP, ARGO, EXO, nEXO, MiniClean, NEST, NOvA, JUNO, and maybe KAMLAND
- software and computing needs from your community
 - TBD: Needs being defined at [DANCE](#) workshop around analysis tools, DAQ, data management and distributed computing, machine learning, training, and simulations
 - Pre-whitepaper, agree on issues/challenges limiting science since exponential growth
- ideas for cross-collaborations
 - Science Gateways, IRIS-HEP, Geant4, NEST, OSG, and Anaconda participating in meeting
 - First identifying short term limited scope intercollaboration, and longer term larger collaborations
- Community building challenges:
 - Community very diverse so any topic/solution/tech overlaps with many, but few with all
 - First such meeting trying to establish computational voice to help all experiments and grow from there

DANCE 2019

Dark-matter And Neutrino Computation Explored
Analysis Software, Machine Learning,
Data Acquisition & Distributed Computing
October 28th and 29th, 2019
Houston, Texas



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Nuclear physics