

Responses to Review Questions

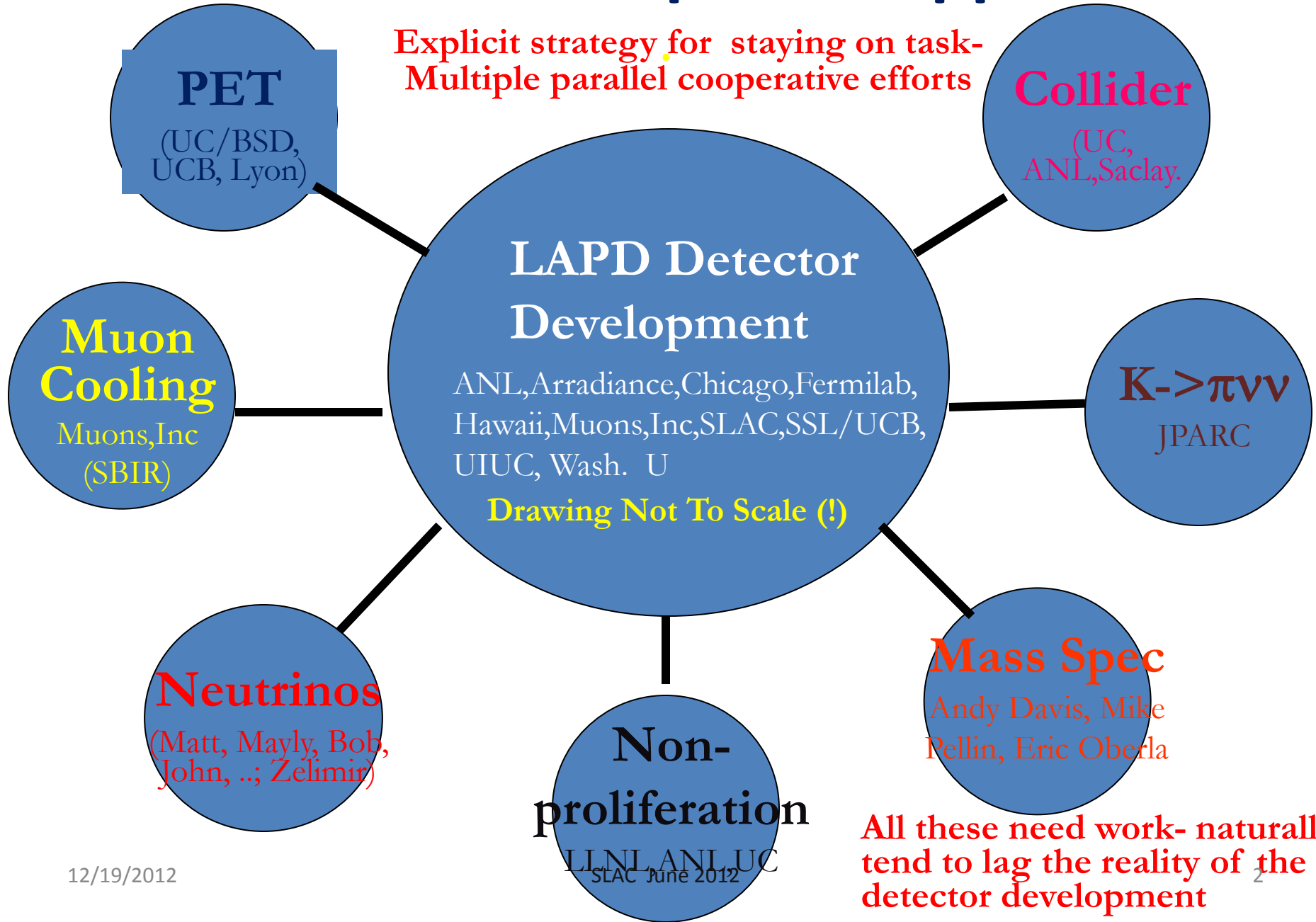
DRAFT

H. Frisch, for the LAPPD Collaboration

18 December 2012

Parallel Efforts on Specific Applications

Explicit strategy for staying on task-
Multiple parallel cooperative efforts



All these need work- naturally tend to lag the reality of the detector development

MODEL OF ADOPTION

- Model of adoption has been established and is in use:
 - Adopters request LAPPD modules and contacts
 - We ask for simulation effort to establish specs, benefits
 - Presumably at this point adopters write a proposal to funding agencies or labs

SRI Rubric: Need, Approach, Benefit, Competition

Application	Market Need	Approach	Benefit	Competition
Non-cryogenic Tracking Neutrino Detectors	HEP-Fermilab	Very-large-area, bialkali-cathode	Bkgd rejection, Cost, Readiness	Liquid Argon
LE Neutron Detection	Neutron Diffraction	B or Gd Glass no cathode	Time and Position resolution, pulse shape γ/n differentiation, Large area	He3, B tubes
LE Neutron Detection	Transportation Security	B or Gd Glass no cathode	Large area pulse shape γ/n differentiation, Large area	He3, B tubes
LE Anti-Neutrino Detection	Reactor Monitoring	Large-area, bialkali-cathode	Efficiency, Cost	PMT's, SiPMs
HE Collider Vertex Separation	CERN	Psec TOF	Resolution, Radiation-Hard	Silicon Vertex
HE Collider Particle ID	CERN, Future Lepton Collider	Psec TOF	Resolution Reach in P_T	None
π^0/η Reconstruction and ID	Rare K Decays (JPARC), Fermilab	Psec TOF	Combinatoric Bkgd Rejection	Conventional TOF
Strange Quark ID	RHIC (BNL), ALICE (LHC) Collider	Psec TOF	Resolution Reach in P_T	dE/dx
Positron-Emission	Clinical Medical Imaging	TOF, Large Area	Lower Dose Rate, Faster throughput	SiPM

12/8/2012

Proprietary – Not for Release

21

Responses To Review Panel

Question 1: What limited number of applications would you target as priorities in the next stage of development and why?

Answer: Three HEP and two directed toward market expansion:

- 1. TOF in the LArIAT Beam**
 - a) Why: Simplest set-up that has a large impact on HEP programs**
 - b) Straight-forward interface to experiment**
 - c) Local, have collaborators in place;**
 - d) Drop in for scintillators and PMTs at higher cost and better performance**
 - e) Spec: 4 stand-alone single tile stations, 10 psec time resolution, 50KHz (needs checking)**

- 2. Small (1-4 m³) water neutrino detector prototype**
 - a) Why: Comparison to simulation; test of the optical TPC concept with track reconstruction**
 - b) If successful, no competition**
 - c) From 1 to 6 SuperModules;**
 - d) Spec: Single pe resolution ~ 100psec, low rate**

3. Pre-converter in KOTO

- a) Why: Archetype for 3D localization and precise timing of high energy photons**
- b) Good access to management and technical expertise in the experiment**
- c) If successful, no competition**
- d) 1-4 SuperModules**
- e) Spec: Timing = 1 psec; Rate = 200 kHz; Position = several mm; Trigger latency = 5 μ sec**
- f) HEP benefit: Increased physics reach**

4. PET

- a) Why: Potential to decrease patient dose rate by >10 or increase patient throughput**
- b) Current state of the art = 300 psec**
- c) Spec: 50 psec (FWHM) TOF-PET resolution**
- d) HEP benefit: Potentially large market drives the cost down**

5. High spatial resolution X-ray diffraction

- a) Why: Large area detector with high spatial resolution**
- b) Large area, high spatial resolution, multi-channel solid state detectors are very expensive and slow**
- c) Spec: 100 μm spatial**
- d) HEP benefit: Increase cross-disciplinary ties**

Responses to yesterday's and dinner's discussion

HJ Frisch

- Broad Brush- request is to continue at same level as last 3 years, plus bump for Tile Facility at ANL
- ANL is the right place to bring multi-disciplinary expertise and facilities to HEP
- We have assembled a strong group comprised of national labs, universities, and industry- have momentum. Success depends crucially on pace- detector projects historically die if they don't move quickly into experimental use

Responses to yesterday's and dinner's discussion: risk

HJ Frisch

- Technical risk for the next 3 years is less than for the first 3 years
- Risk now is of a different type-
 - Market: Depends on:
 - Interest of users
 - Structural ability of user community to adopt new technologies (funding, career paths)
 - Ease of early adoption
 - Model of adoption has been established and is in use:
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