

Success from TAMU Bootcamp and NSRL Radiation Test Workshop

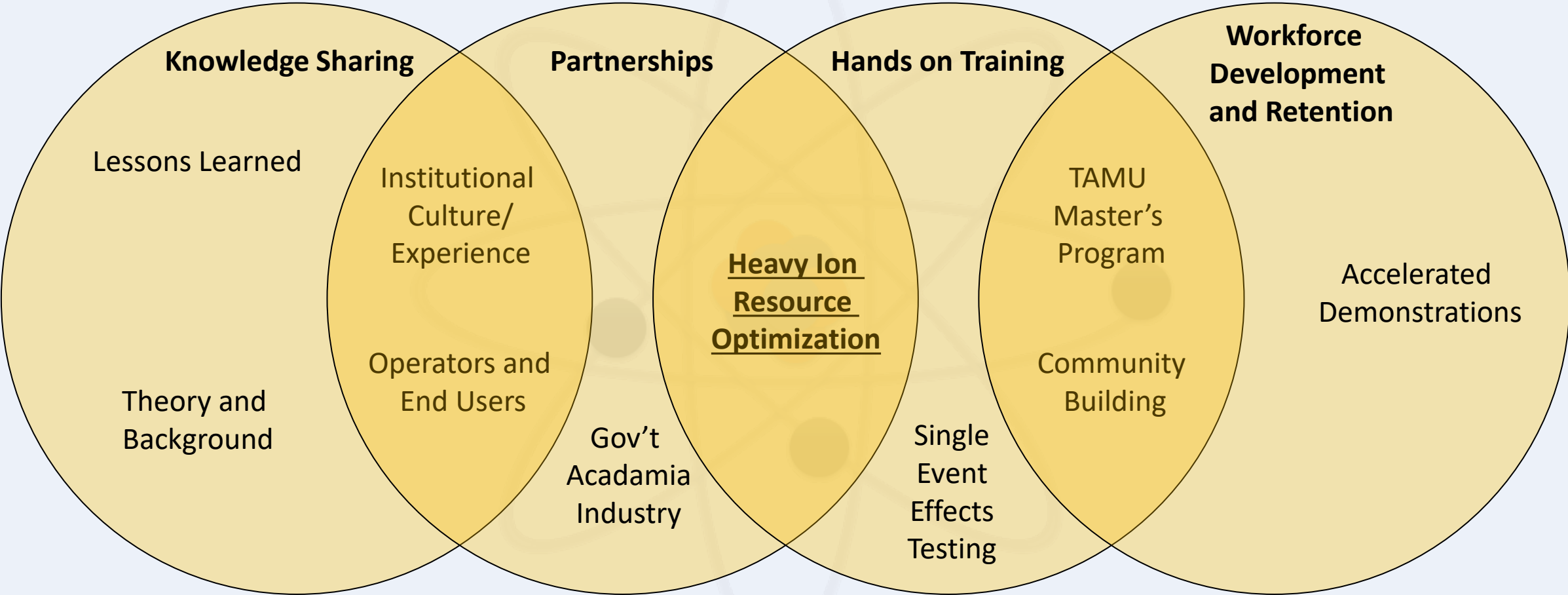
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Greg Allen (NASA JPL),
Michael McKenna (MDA)

Intro – The Elements of Circumstance



- Who's it for?
 - Engineers, facility operators, scientists, students, technicians – intended to be broadly applicable for many different roles
- Why's it needed?
 - Government and commercial space are driving significant increases in SEE testing demand
 - Current heavy ion accelerators have limited capacity and capability
 - More complex electronics and systems require more testing hours
- What's it about?
 - Practical journey down the beamline

Bootcamp/Workshop Highlights



Two Different Models or Approaches

TAMU Bootcamp

- Entirely in person
- Lectures, discussion, and testing at the facility
- Test articles chosen to enforce the basics
- Pre-class experience varied
 - Industry
 - Academia
 - Government
- 15 Attendees

NSRL Radiation Test Workshop

- 3 phases
 - Pre-recorded content on demand
 - Live lectures with Q&A (virtual)
 - In person hands on testing at facility
- Test articles chosen by instructor institutions to benefit with data
- Class makeup
 - Gov't (MDA)
- 10 Attendees

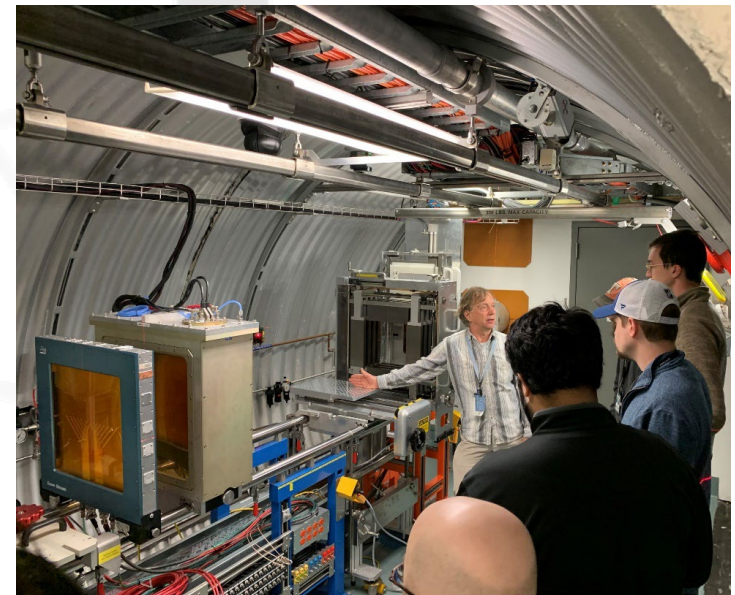
Schedule (@NSRL)

- Test campaigns
 - With instruction
 - For data collection
- Intent was to cover:
 - Reinforcement of principles learned before coming to the facility

	Monday, 21 Mar 2022	Tuesday, 22 Mar 2022	Wednesday, 23 Mar 2022	Thursday, 24 Mar 2022	Friday, 25 Mar 2022
12:00 AM	KEEP OUT	KEEP OUT	KEEP OUT	KEEP OUT	KEEP OUT
1:00 AM					
2:00 AM					
3:00 AM					
4:00 AM					
5:00 AM					
6:00 AM					
7:00 AM	NASA ~ 8 hrs	NSRL Instruction Time	NASA Instruction Time	NSRL Instruction Time	L3Harris Instruction Time
8:00 AM		LUNCH	LUNCH	LUNCH	LUNCH
9:00 AM		NASA ~ 8 hrs	NASA Instruction Time	NASA Instruction Time	Vanderbilt Instruction Time
10:00 AM	NASA ~8 hrs		NASA ~8 hrs	Vanderbilt ~4 hrs	KEEP OUT
11:00 AM				UTC ~4 hrs	
12:00 PM	KEEP OUT	NASA ~8 hrs	NASA ~8 hrs	UTC ~4 hrs	KEEP OUT
1:00 PM					
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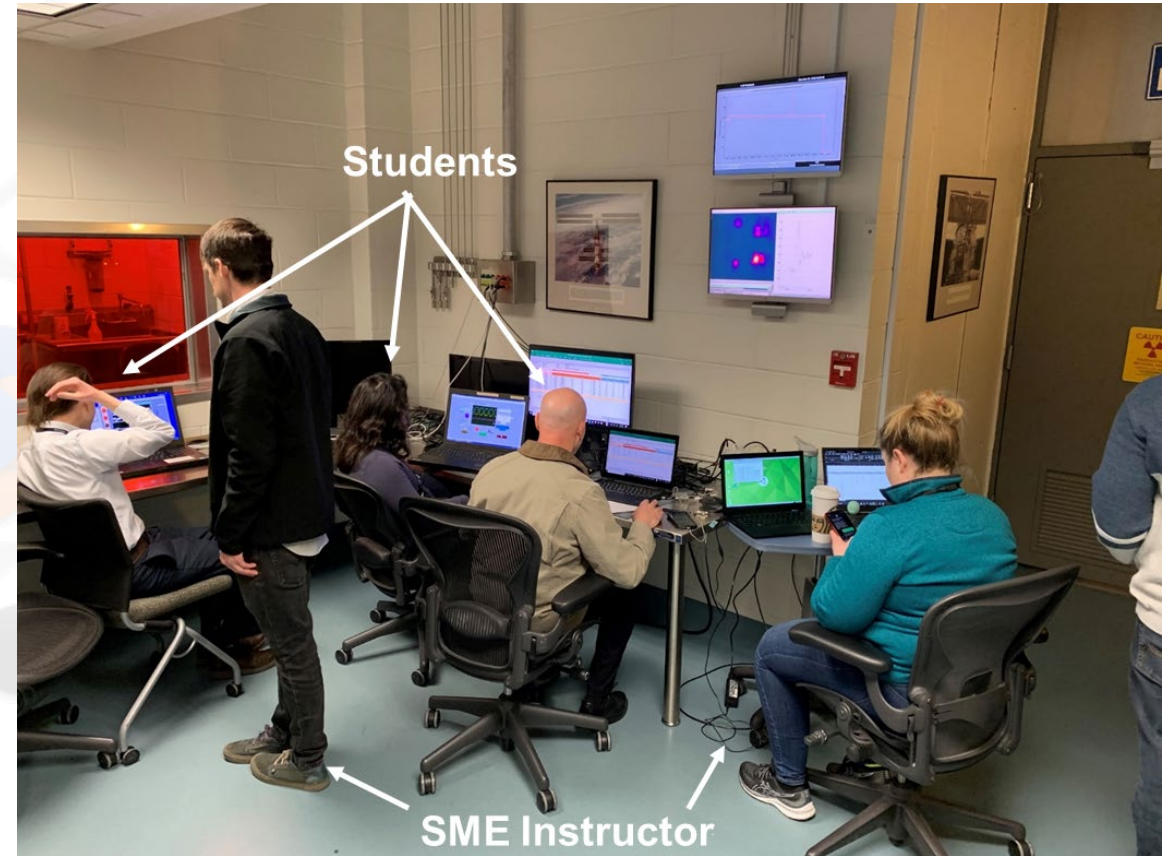
NSRL Facility Instruction

- NSRL facility specific instruction occurred at the beginning of each block for ~3 hours
 - Tour of the facility operations room, target room, and ion source
 - Conducted a demonstration of the NSRL stack up tool and talked about things to consider when creating a beam plan
 - Conducted several experiments with nothing in the beam to demonstrate capability (i.e. such beam steering/shaping, bragg peak demonstration)



NSRL Test Instruction (NEPP Support)

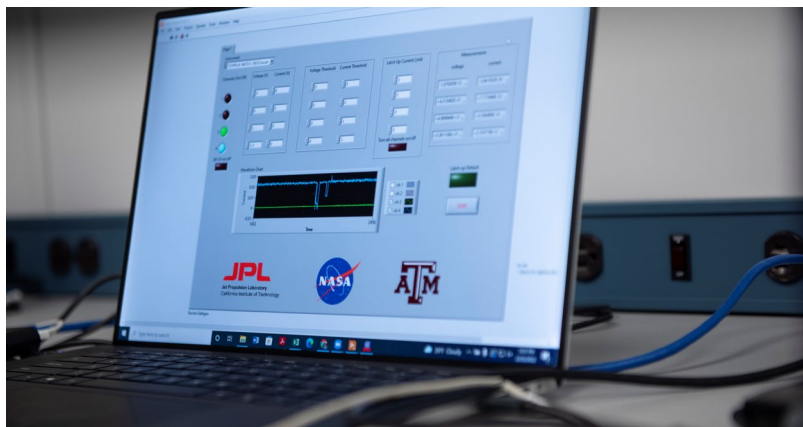
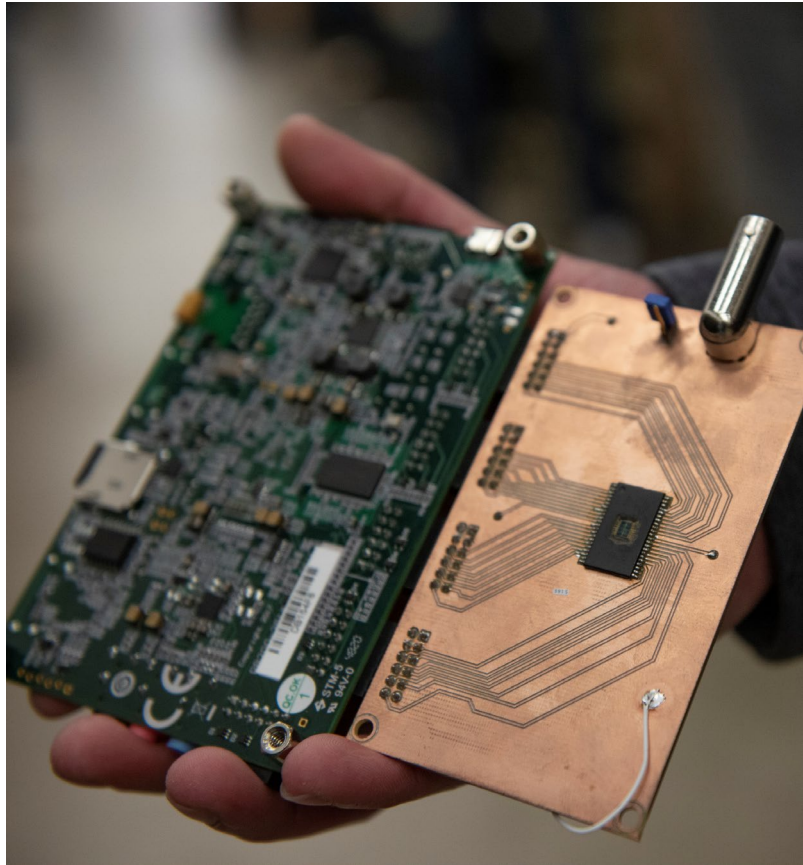
- SME led practical instruction testing various devices following facility instruction
 - Devices were either provided by the instructor or a grad student working for the instructor
 - Each instructor taught about 3-4 hours per device
- Direction given was simply to walk students through test execution activities
 - Each instructor handled this differently



Schedule (@TAMU)

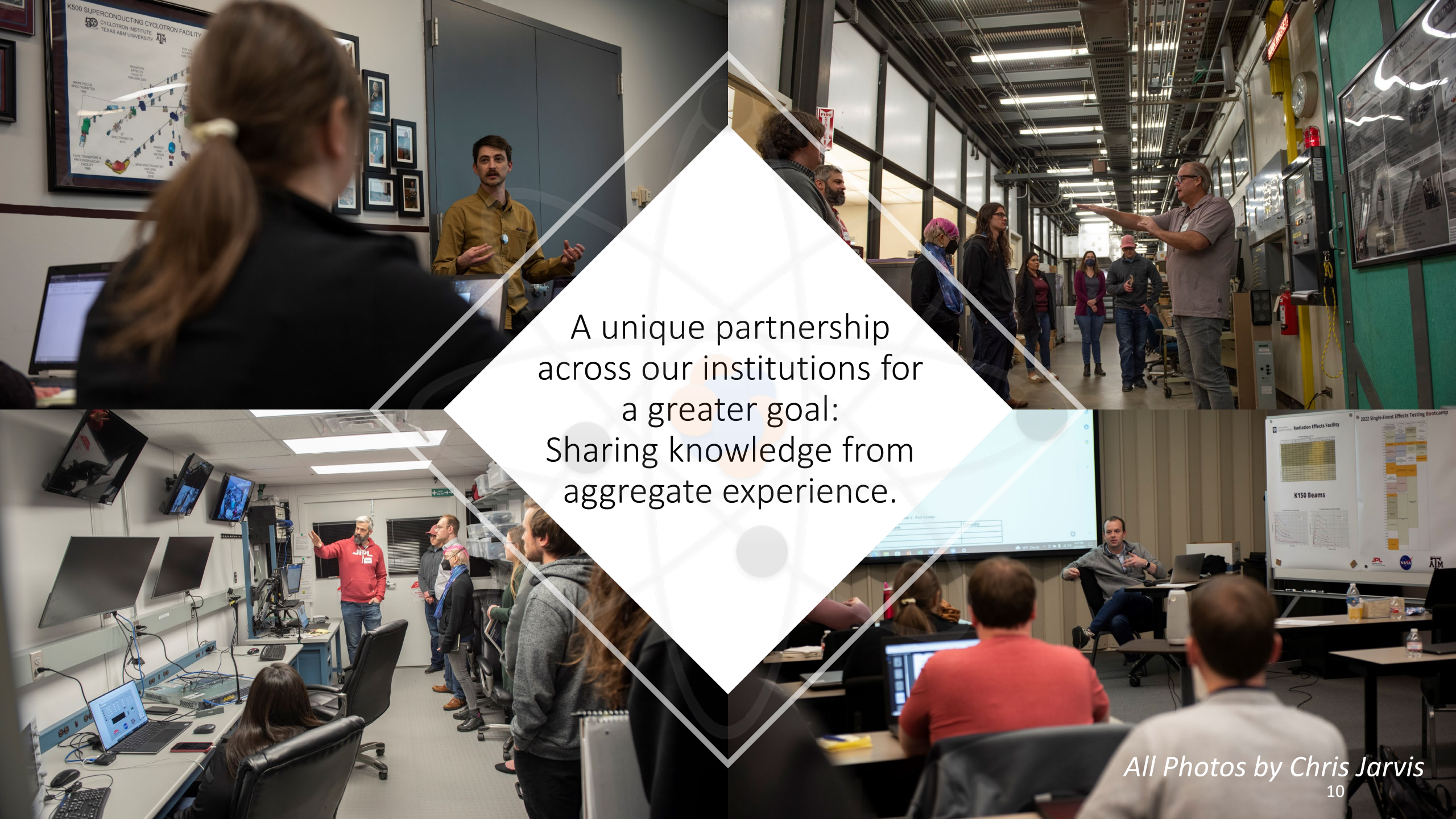
- Held over 4 long days
- Two test campaigns
- Lectures and Hands-on work
- Intent was to cover:
 - Why we test using heavy ions
 - How we prepare and execute
 - Firsthand experience of testing
 - What types of data analysis we do
 - Shared experiences from working as a radiation effects engineer

Thursday, 24 Feb 2022	Friday, 25 Feb 2022	Saturday, 26 Feb 2022	Sunday, 27 Feb 2022
	Intro to Day 2	Intro to Day 3	Intro to Day 4
Intro to the bootcamp curriculum	Hands on: Requirement Document Discussion / Interactive Development	Facility Considerations & Differences	Hands on: SET Data Analysis
Introduction to Bootcamp: Why We Do This	Test Planning & Preparation	Data Analysis & Interpretation	Hands on: Rate Calc on Your Own with support
Break (15min)	Break (15min)	Break (15min)	Break (15min)
SEE Basics & Test Execution Definitions	Test Planning & Preparation	Data Put to Use: Likelihood & Rate Calculations	Common Mistakes: "Tales from the Cave"
Environments & SEE	Hands on: Write an RTP with the class Go over case study DPA and prep	Hands on: Plotting and Fitting SRAM data + CRÉME rate calc.	Project Saves
Lunch (1 hour)	Lunch and Learn (1 hour) The Shape of Things to Come	Lunch and Learn (1 hour) SoC Testing	Bootcamp Wrap up (30min)
Hands on: CRÉME (and/or OMERE?) Environment and Transport	Test Execution Refined	Single Event Transient Testing (K150)	
Test Execution Definitions	Hands on: Have the class develop a Beam Log		
Break (15min)			
Cyclotron Overview	Single Event Upset Testing (K150)		
Cyclotron Tour			
Requirements & Goals			



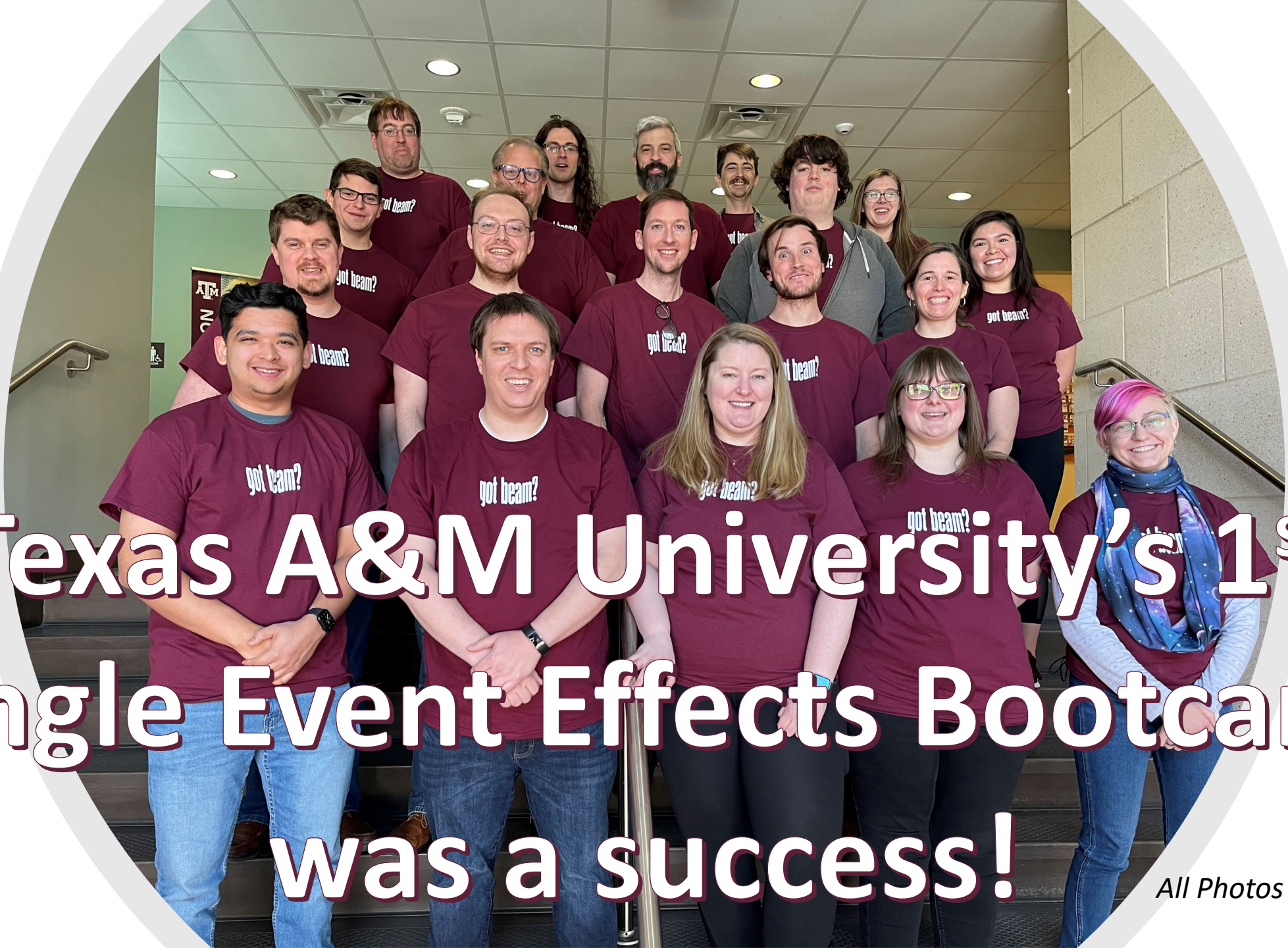
Hands on Experience for TAMU Students

All Photos by Chris Jarvis



A unique partnership
across our institutions for
a greater goal:
Sharing knowledge from
aggregate experience.

All Photos by Chris Jarvis



**Texas A&M University's 1st
Single Event Effects Bootcamp
was a success!**

All Photos by Chris Jarvis

If you are interested
in attending or being
informed on updates
to our next rendition
let us know!

