

Q-Pix Collaboration Meeting

April 2nd and 3rd 2020

Jonathan Asaadi
David Nygren

Thank You!

- **The last year has been an absolute pleasure collaborating with everyone as we work to realize this novel detector concept!**
- **Special thanks to everyone for preparing material for this meeting and the review**
 - Continuing this work in these extraordinary times we find ourselves is much appreciated!
- **Not everyone of our collaborators was able to attend/present at this meeting**
 - We will continue to work with them and hope to have future updates at our bi-weekly meetings

Goals of the next two days

- **To give everyone involved a snapshot of the current effort and status**
 - Groups can introduce themselves and the work they've been doing as well as the work they have planned
- **To try to focus our efforts into a timeline with various goals and milestones**
 - All of this done with the realization that we live in uncertain times
 - "Plans are worthless, but planning is everything" - Eisenhower
- **Friday's "Technical Review" will allow us to get critical feedback as we proceed from concept to prototype (hopefully) this year**

Timelines (what is in the proposal)

Simulation

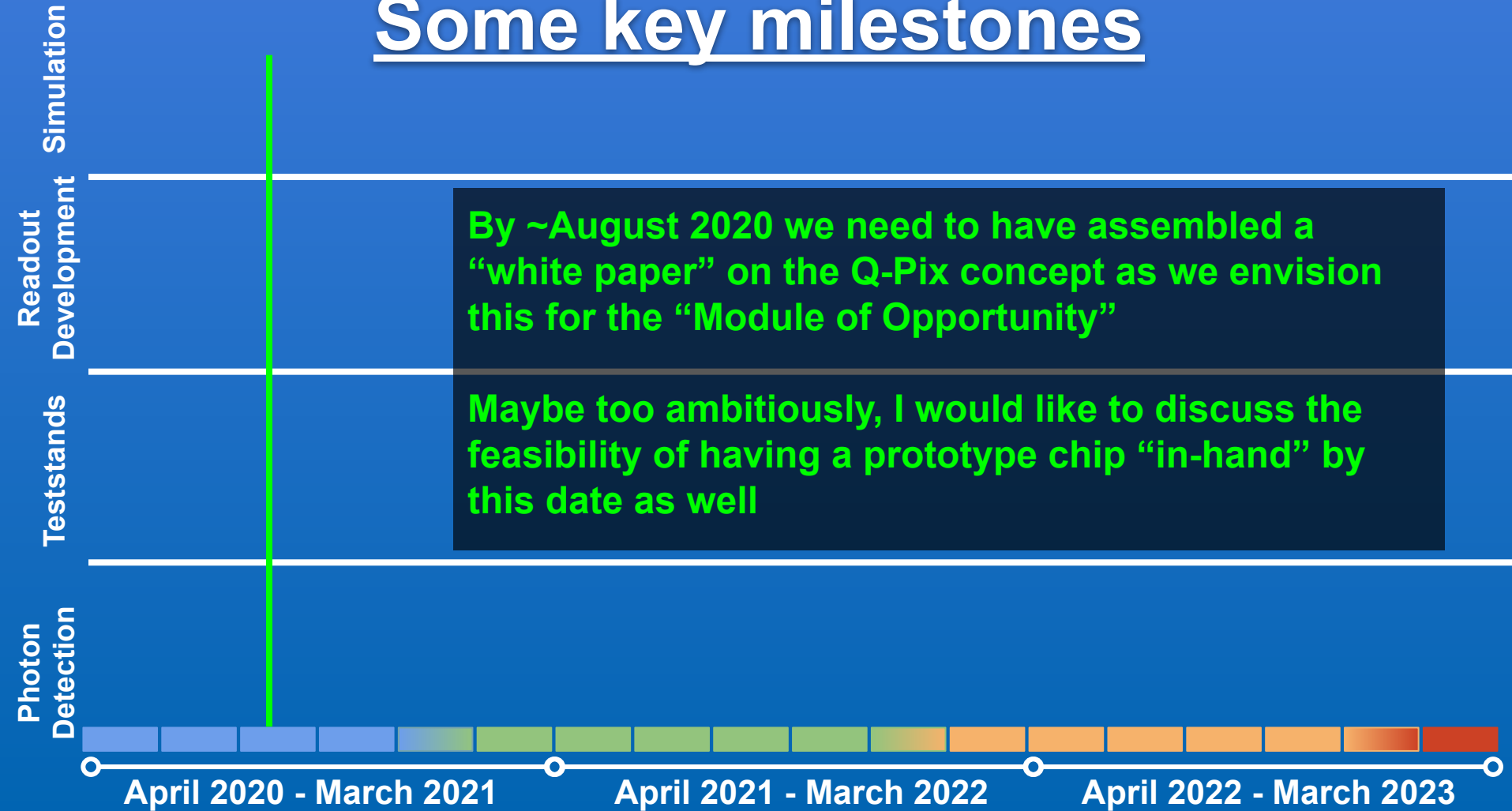
Readout
Development

Teststands

Photon
Detection



Some key milestones



White Paper

- Following the MOOD meeting in November, each technology proponent is asked to prepare “complete detector concepts”
 - [\(defined on slide 28 this talk at the Jan 2020 DUNE collaboration meeting\)](#)
 - indico pwd: DUNEnu
- What has to be in the paper
 - Physics capability compared to DUNE SP modules (including impact of the DUNE ND for oscillation physics)
 - Required R&D and prototype plans (any technology will need demonstration of performance and stable operation, as has been done with ProtoDUNE-SP)
 - Infrastructure requirements (for any non-LAr option)
 - Rough core cost estimate

White Paper

● What has to be in the paper

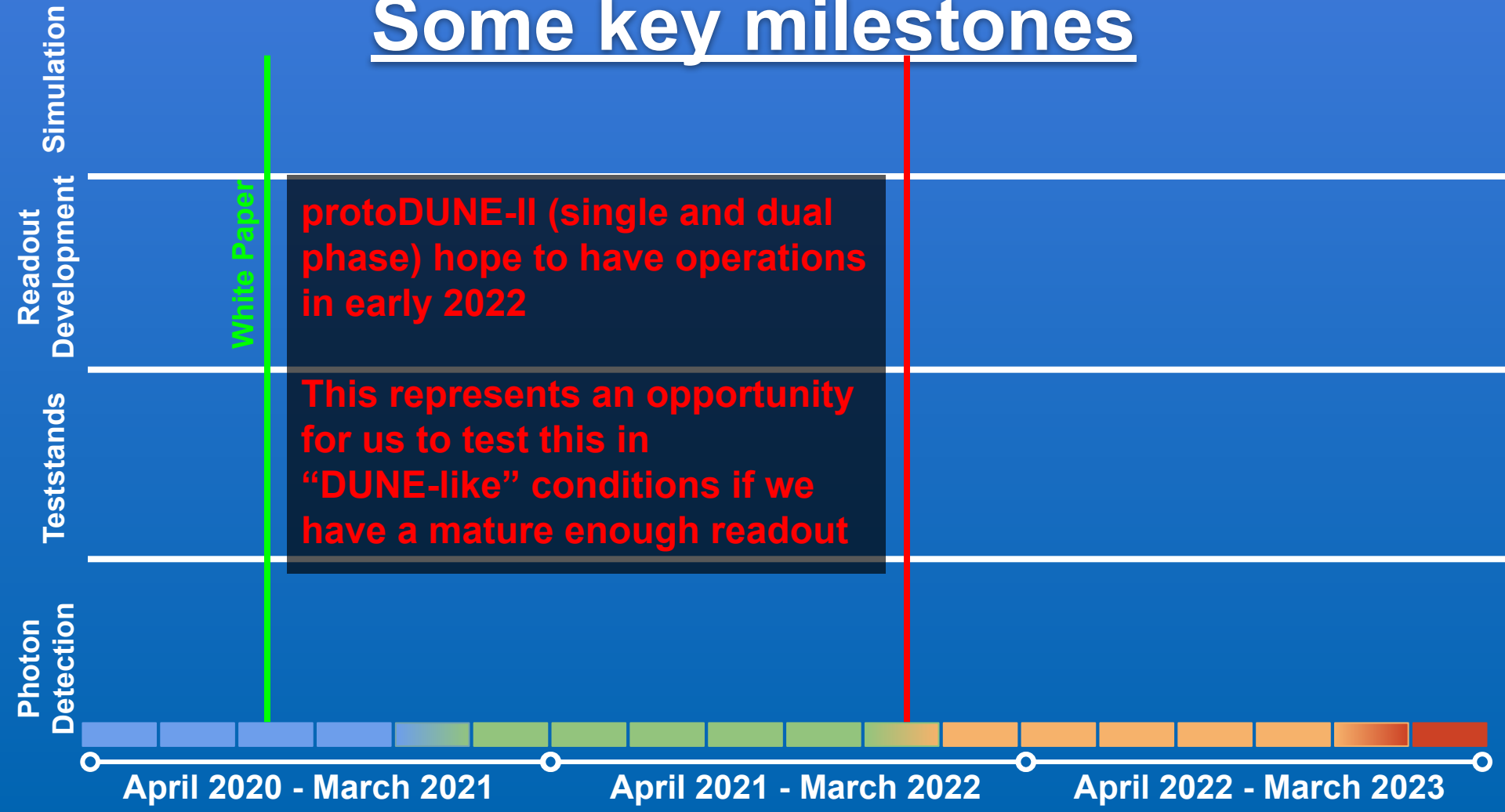
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Some of this we have (ala Pixel vs. wires paper) and some of this we need to develop a bit further with simulation studies

I think we have an idea of the plan ahead and what we can target (e.g. ArgonCube 2x2 demonstrator, protoDUNE, etc)

This is what we need the most and is likely something that can only come from developing further or mechanical model and getting some engineering time to develop a cost estimate

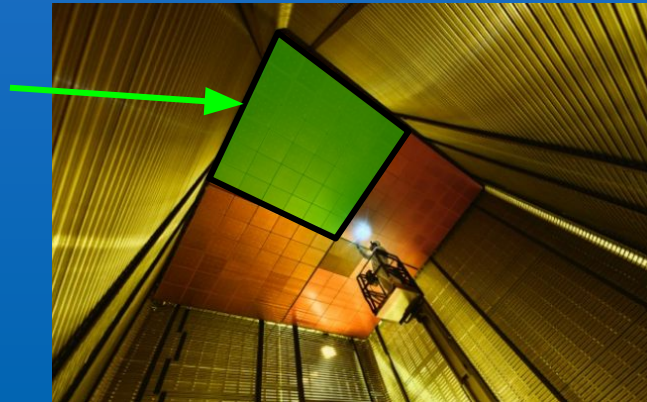
Some key milestones



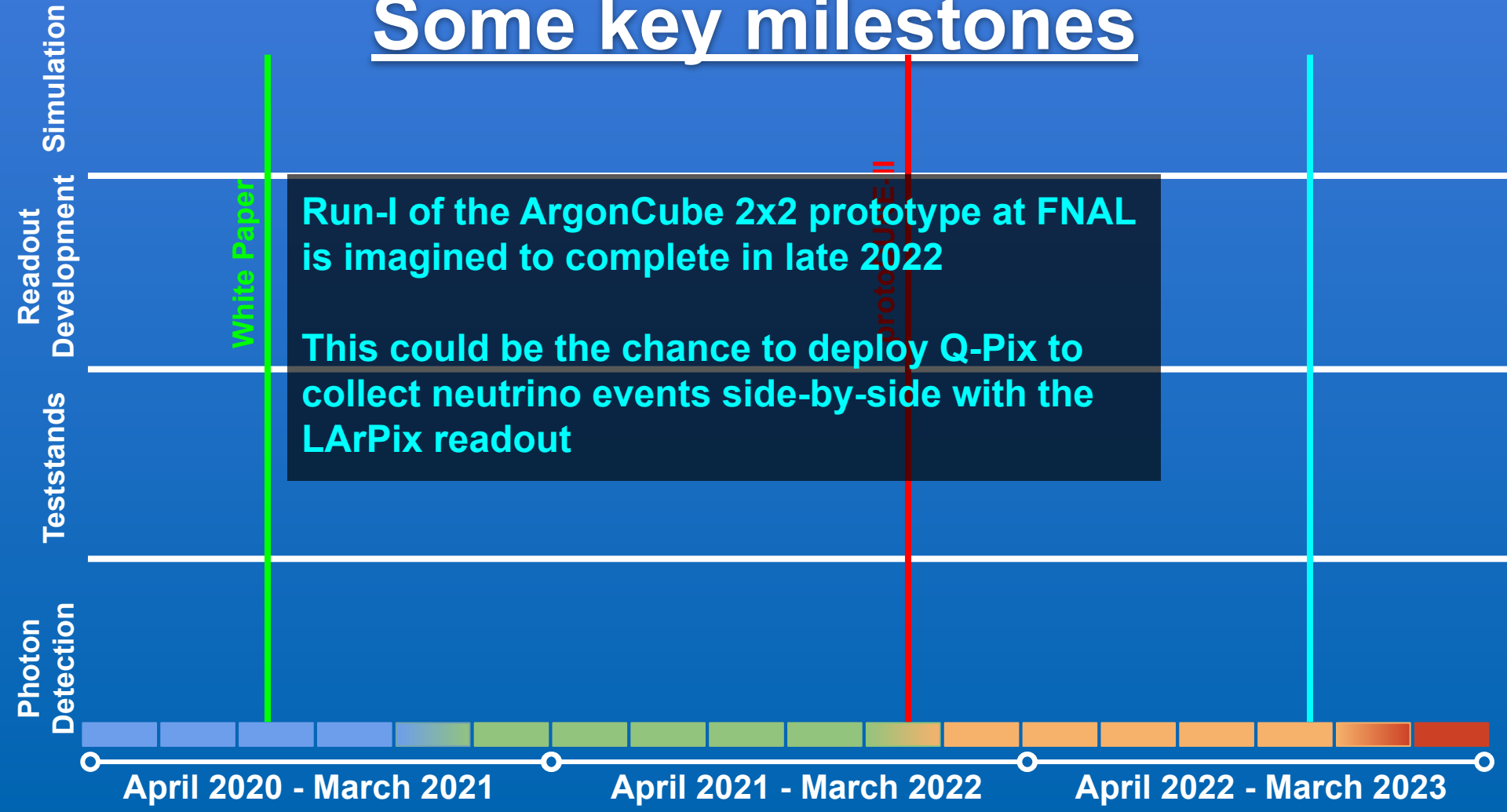
protoDUNE-II

- One idea that has been discussed is utilizing $\frac{1}{4}$ of the Dual Phase detector to be configured to test pixel readout for the far detector
 - There is lots of discussion on how that detector may be reconfigured and things seem in flux...but if we have something ready for testing 3 meter x 3 meter area of pixels this could be a great opportunity

Replace with Q-Pix tiles

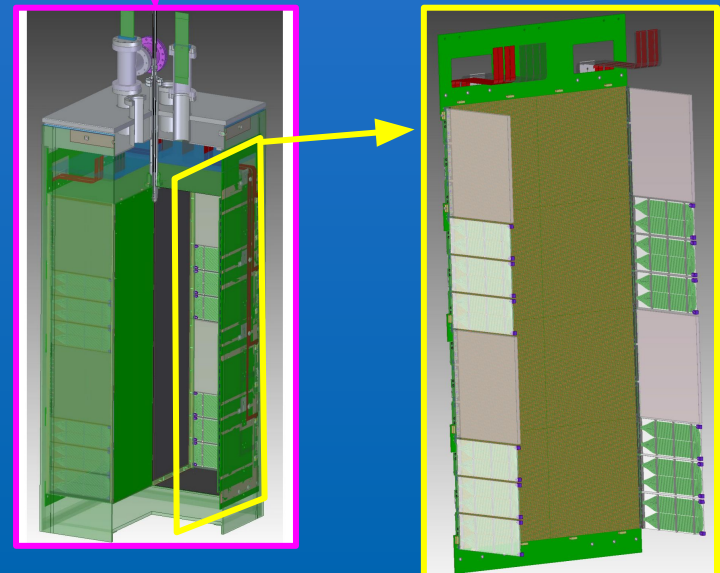
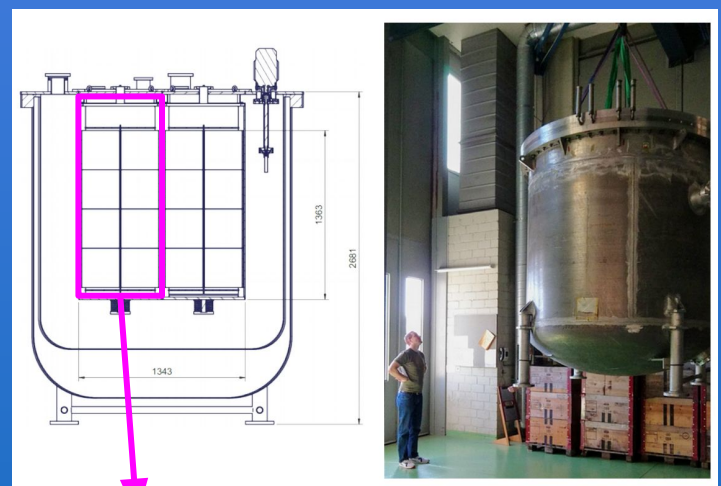


Some key milestones

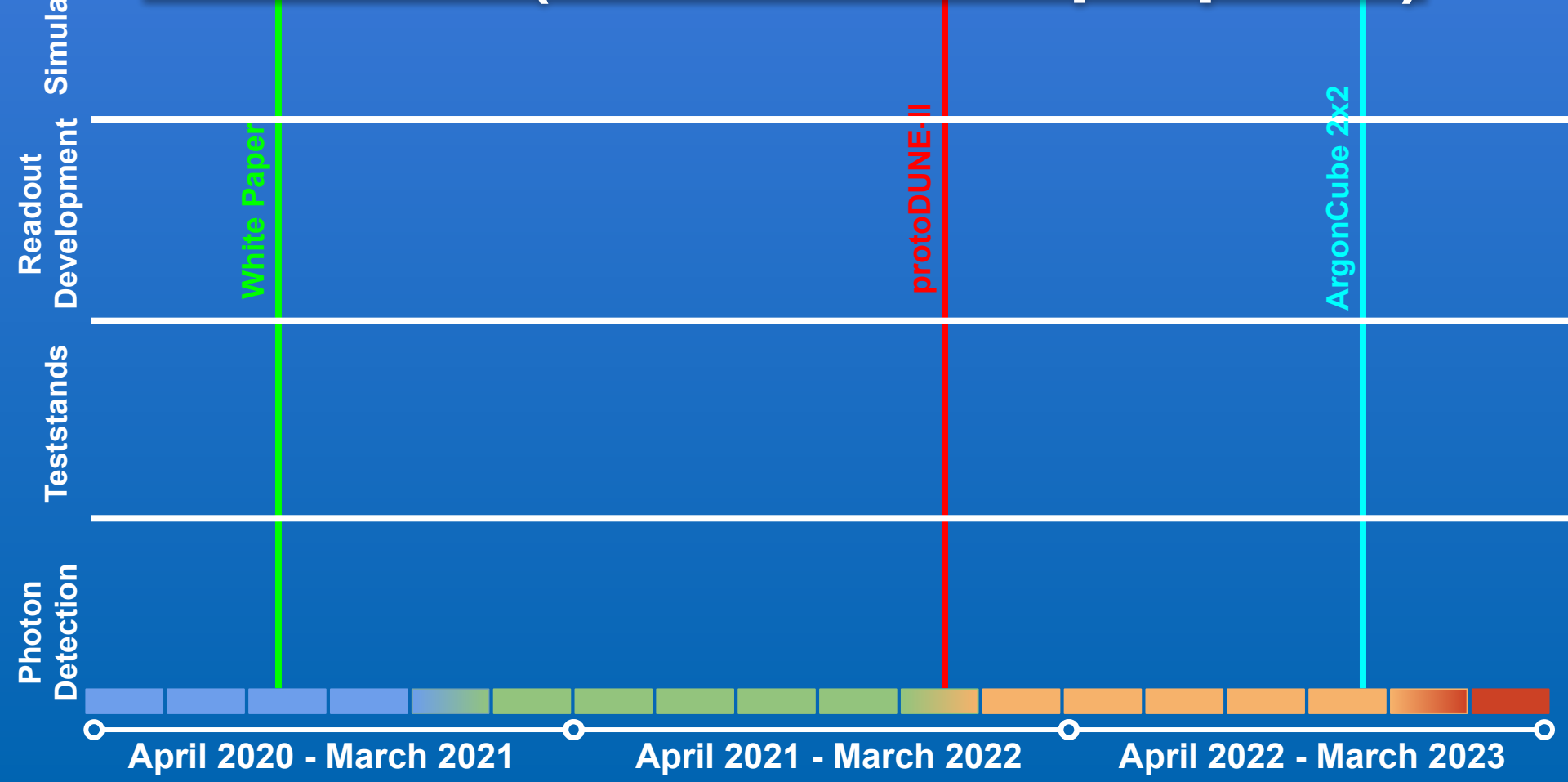


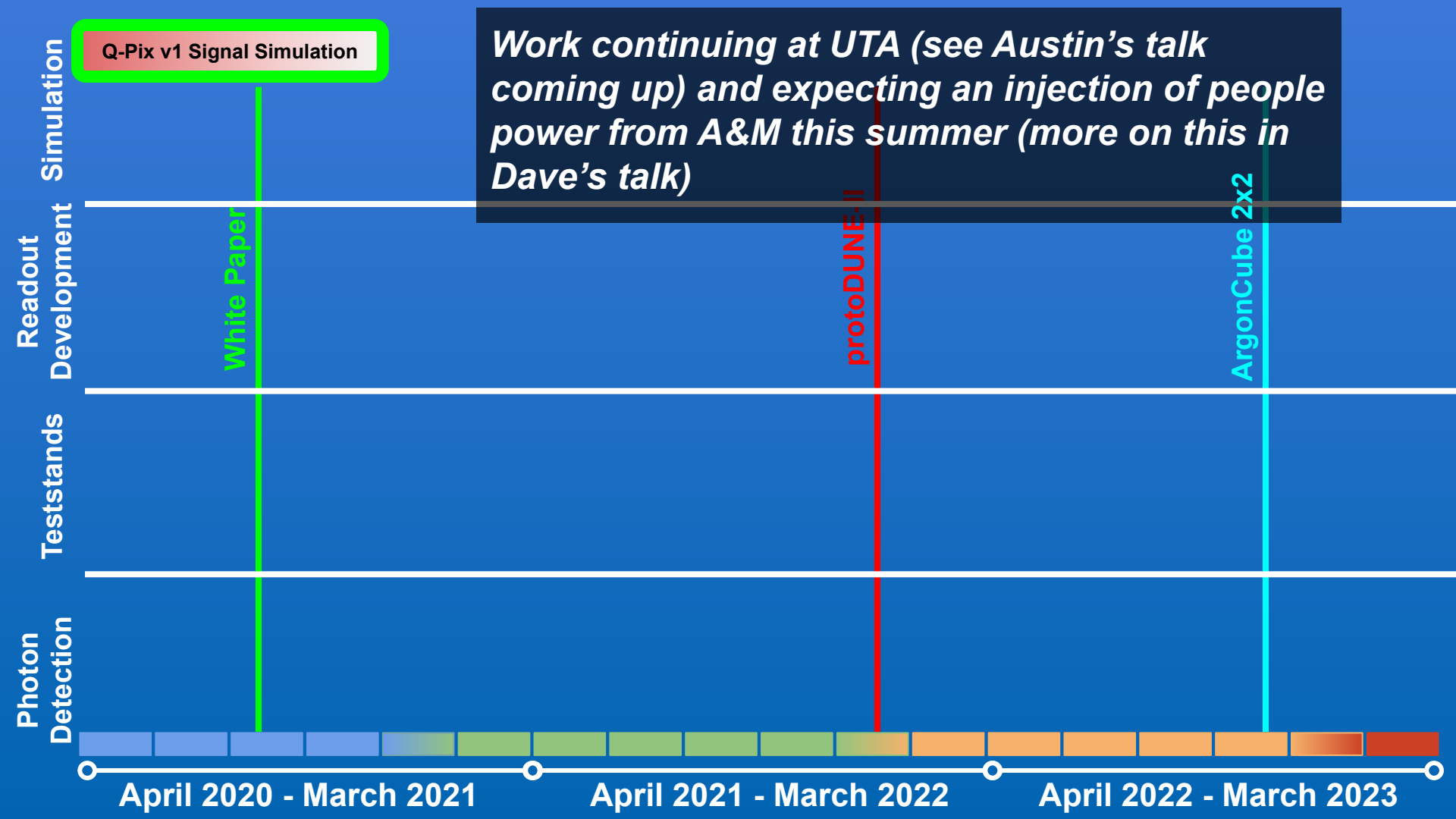
ArgonCube 2x2

- The 2x2 will have four 1.2x1.2x1.2 m³ (active volume) modules
- Each module has two TPC's (cathode in the center)
- Pixel readout tiles are ~30cm x 30 cm
 - 360k pixels total
- Deploying Q-Pix in this system should be a target goal



Timelines (what is in the proposal)





Q-Pix v1 Signal Simulation

Work continuing at UTA (see Austin's talk coming up) and expecting an injection of people power from A&M this summer (more on this in Dave's talk)

White Paper

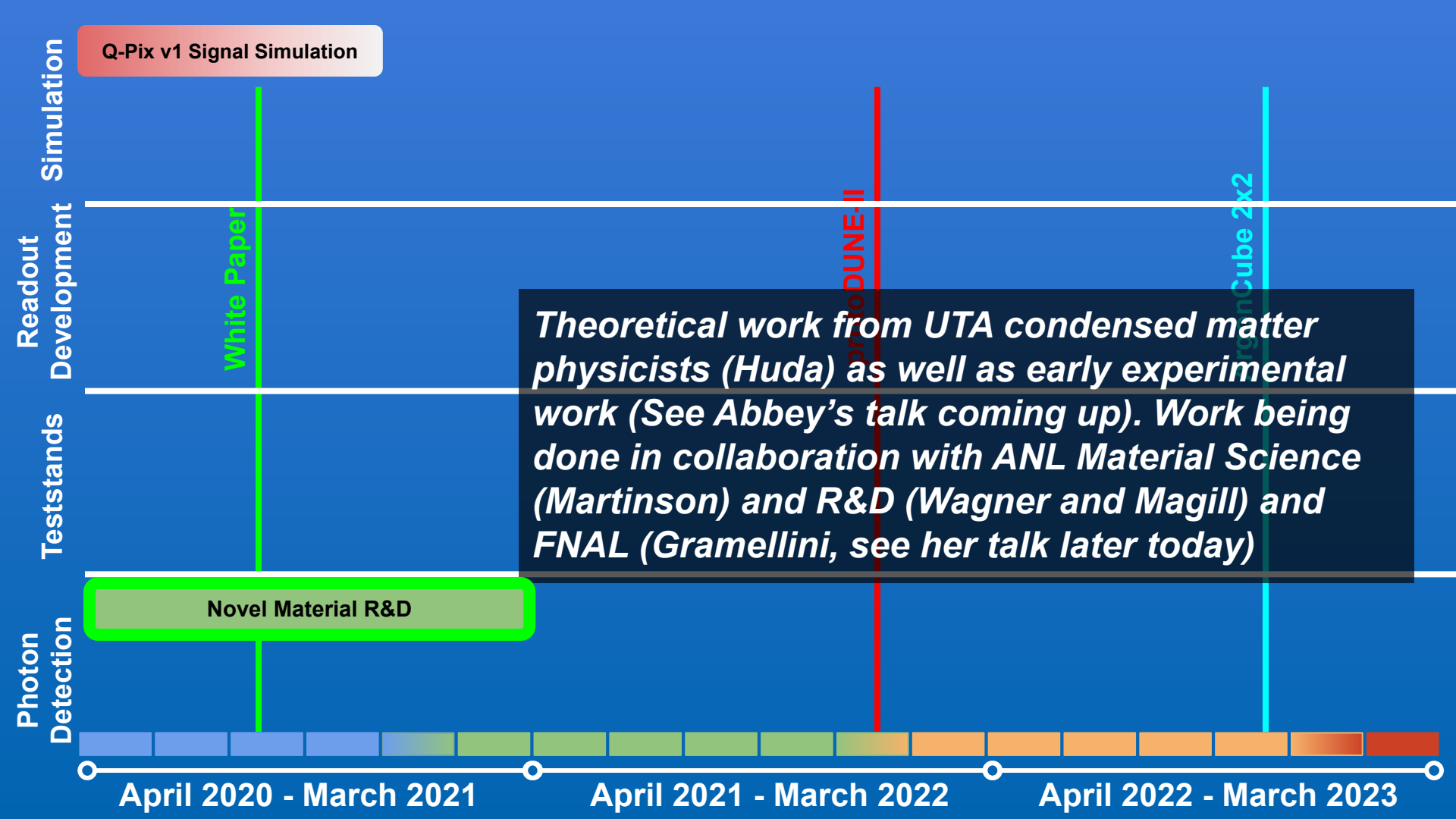
protoDUNE-II

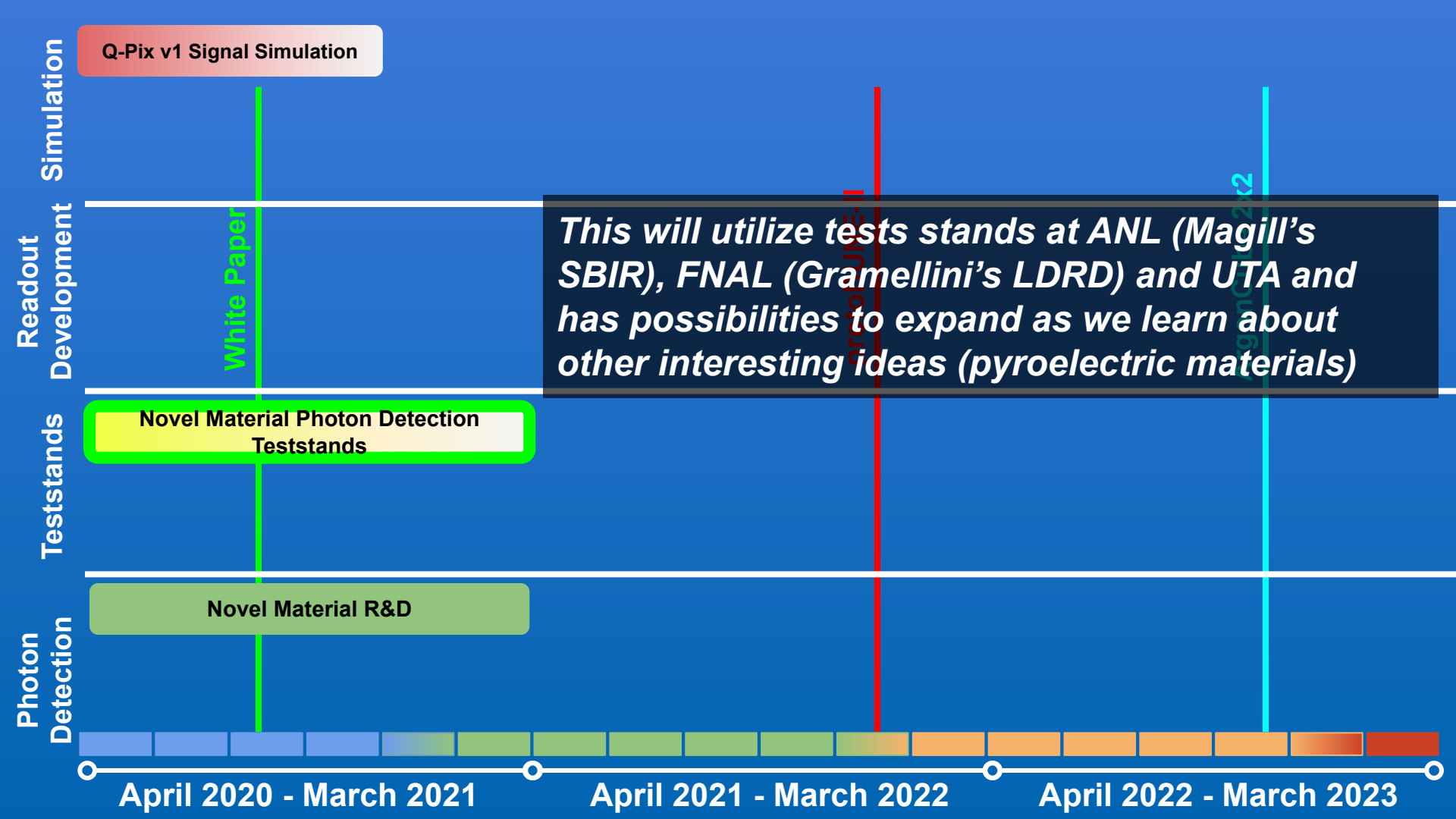
ArgonCube 2x2

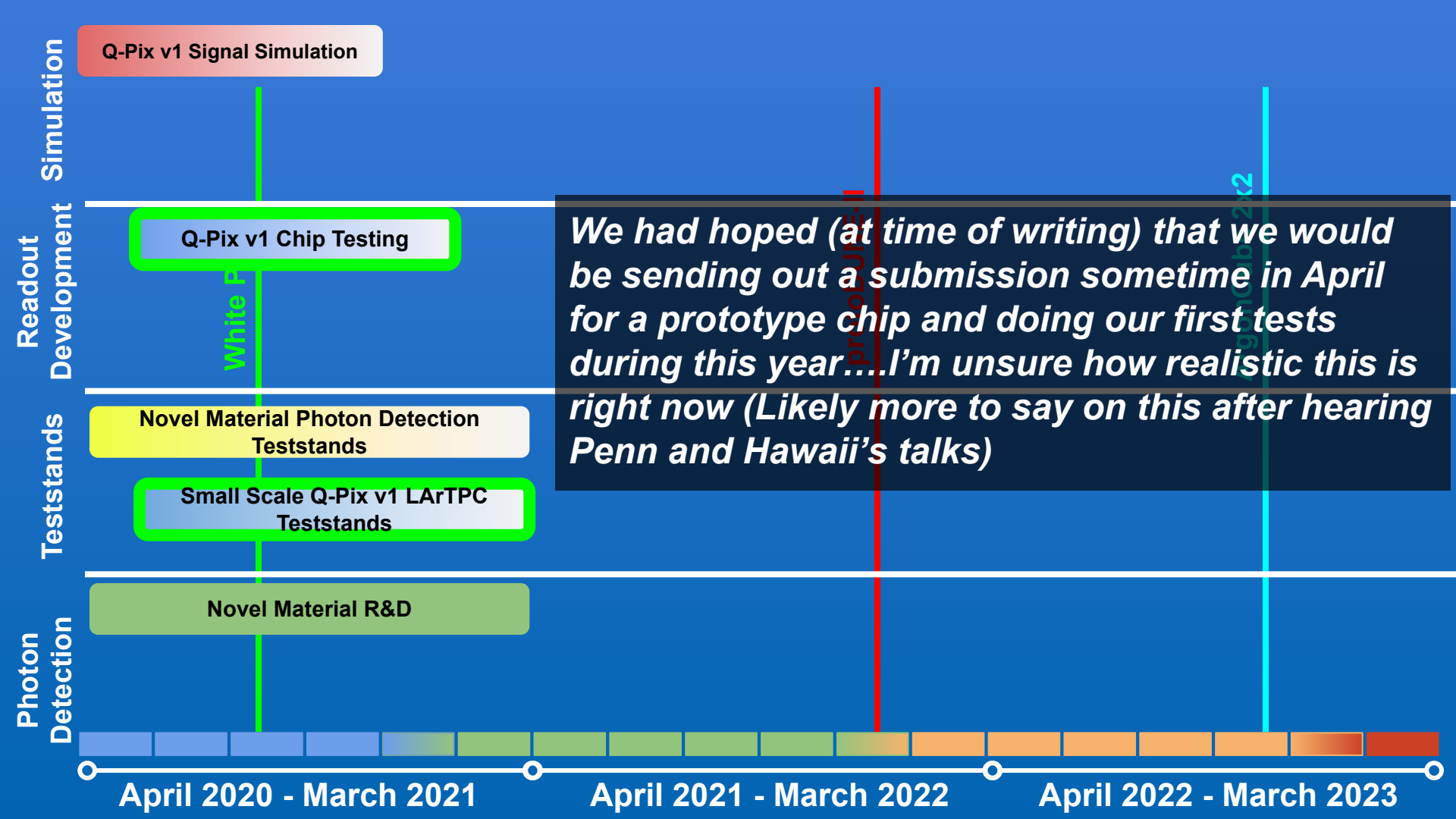
April 2020 - March 2021

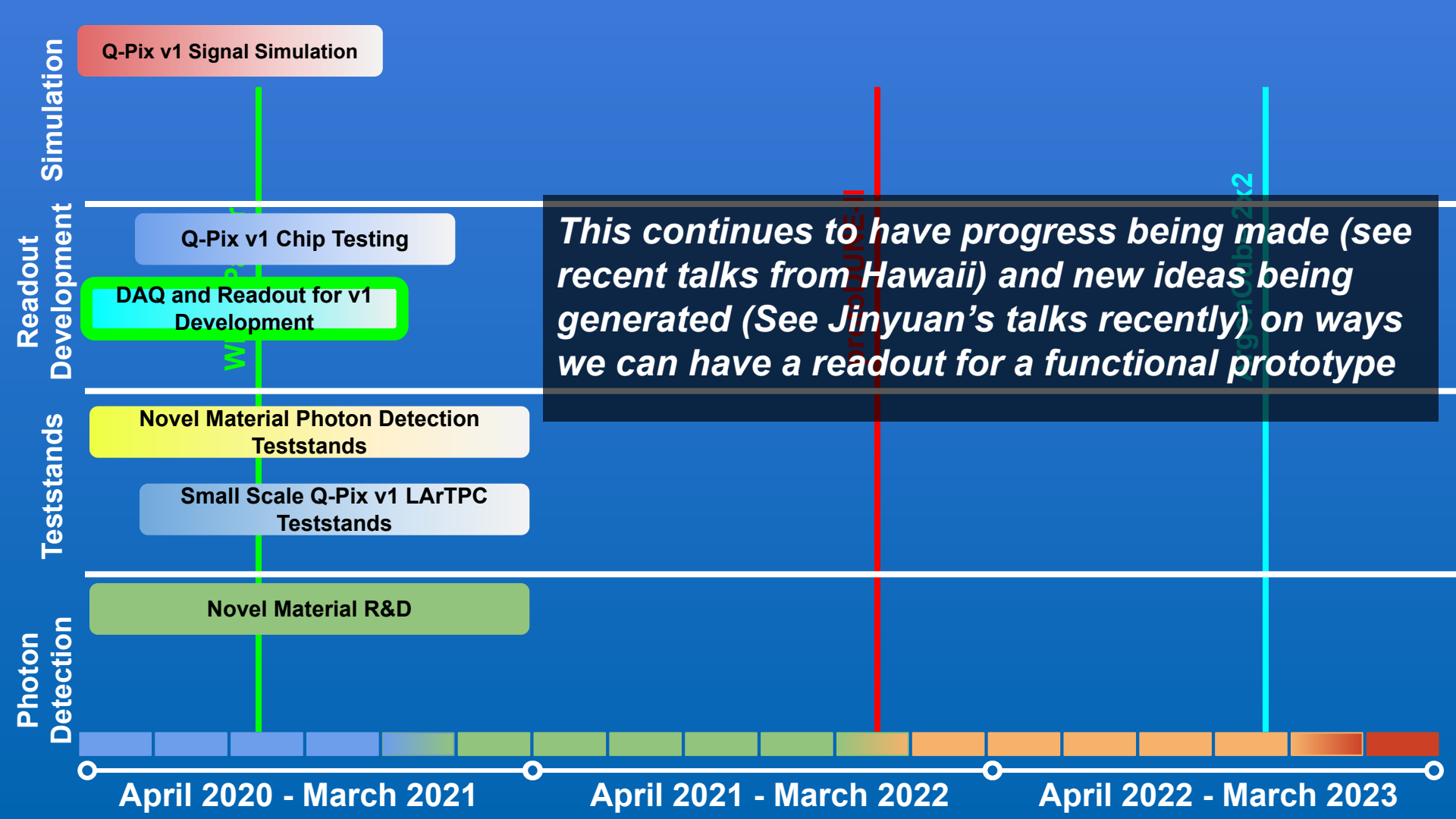
April 2021 - March 2022

April 2022 - March 2023









Q-Pix v1 Signal Simulation

Q-Pix v1 Chip Testing

DAQ and Readout for v1 Development

This continues to have progress being made (see recent talks from Hawaii) and new ideas being generated (See Jinyuan's talks recently) on ways we can have a readout for a functional prototype

Novel Material Photon Detection Teststands

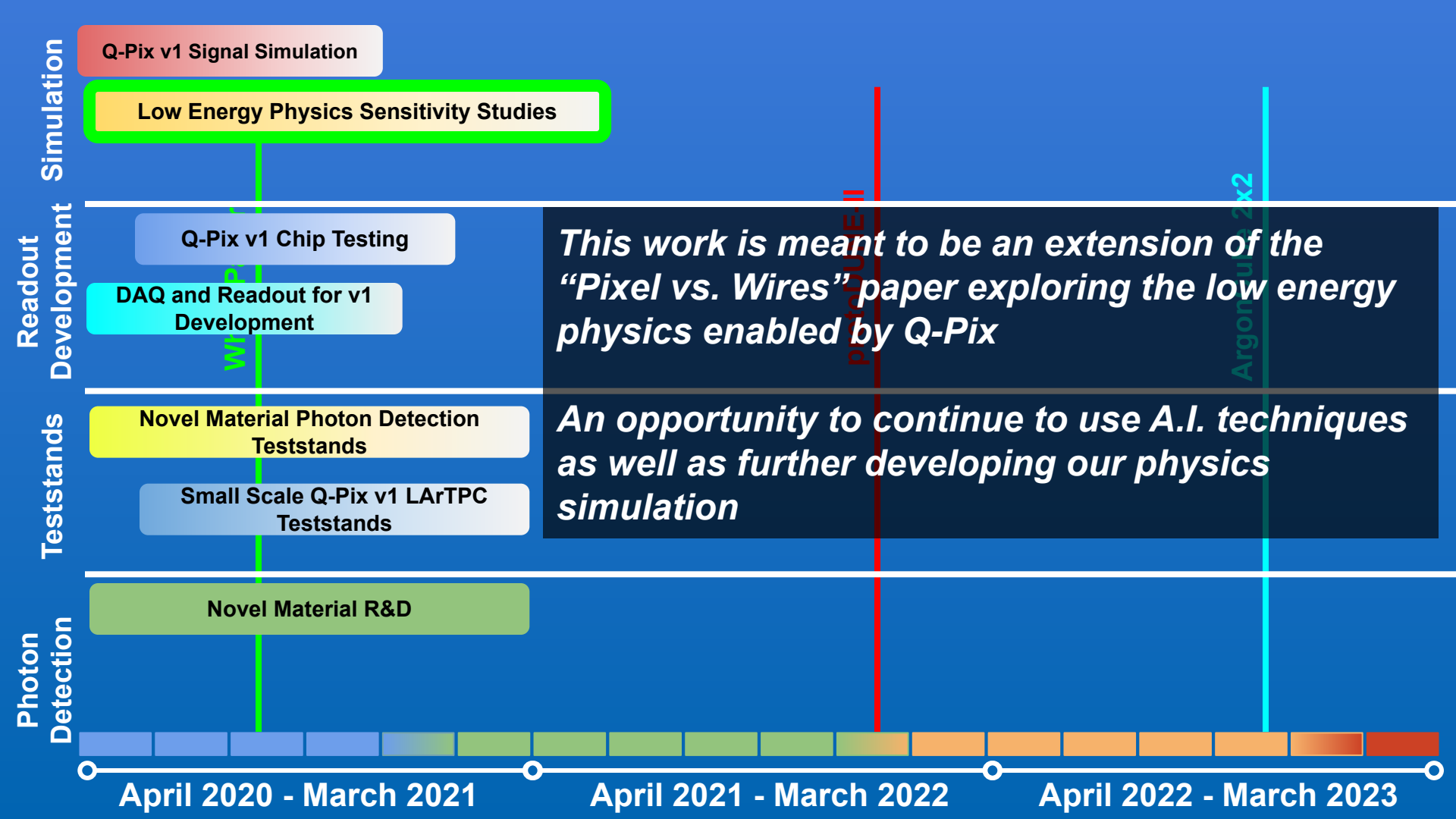
Small Scale Q-Pix v1 LArTPC Teststands

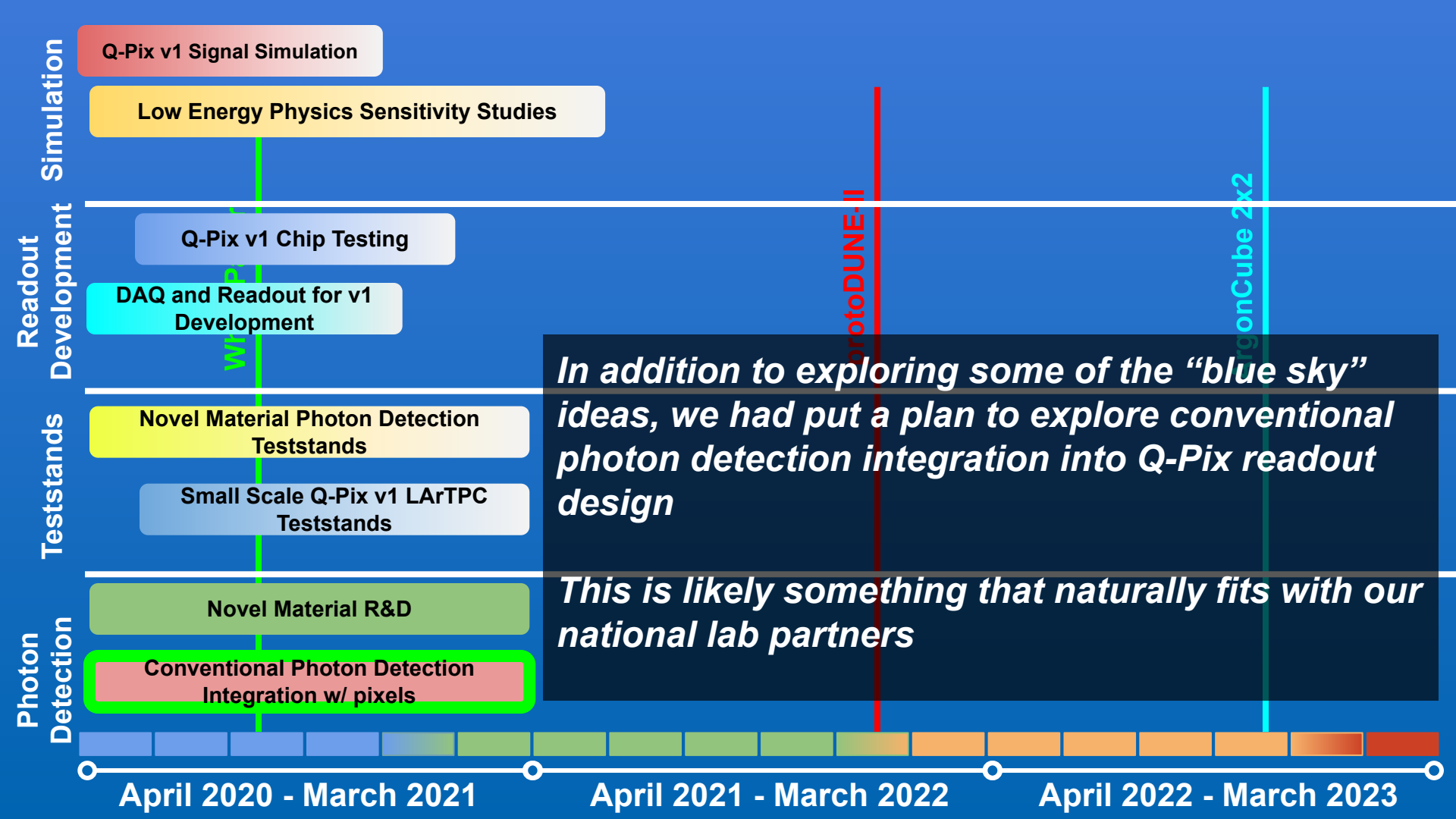
Novel Material R&D

April 2020 - March 2021

April 2021 - March 2022

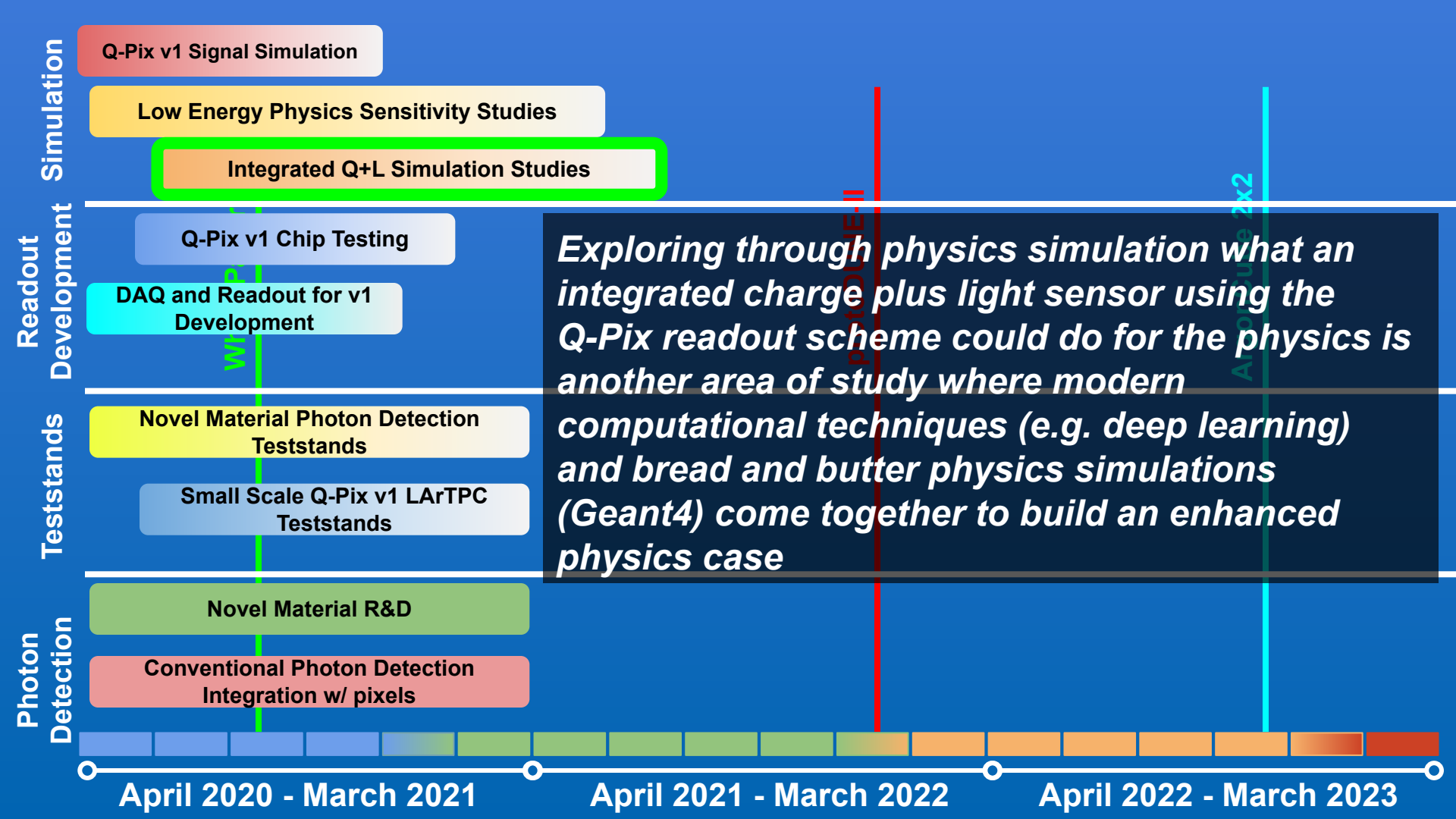
April 2022 - March 2023

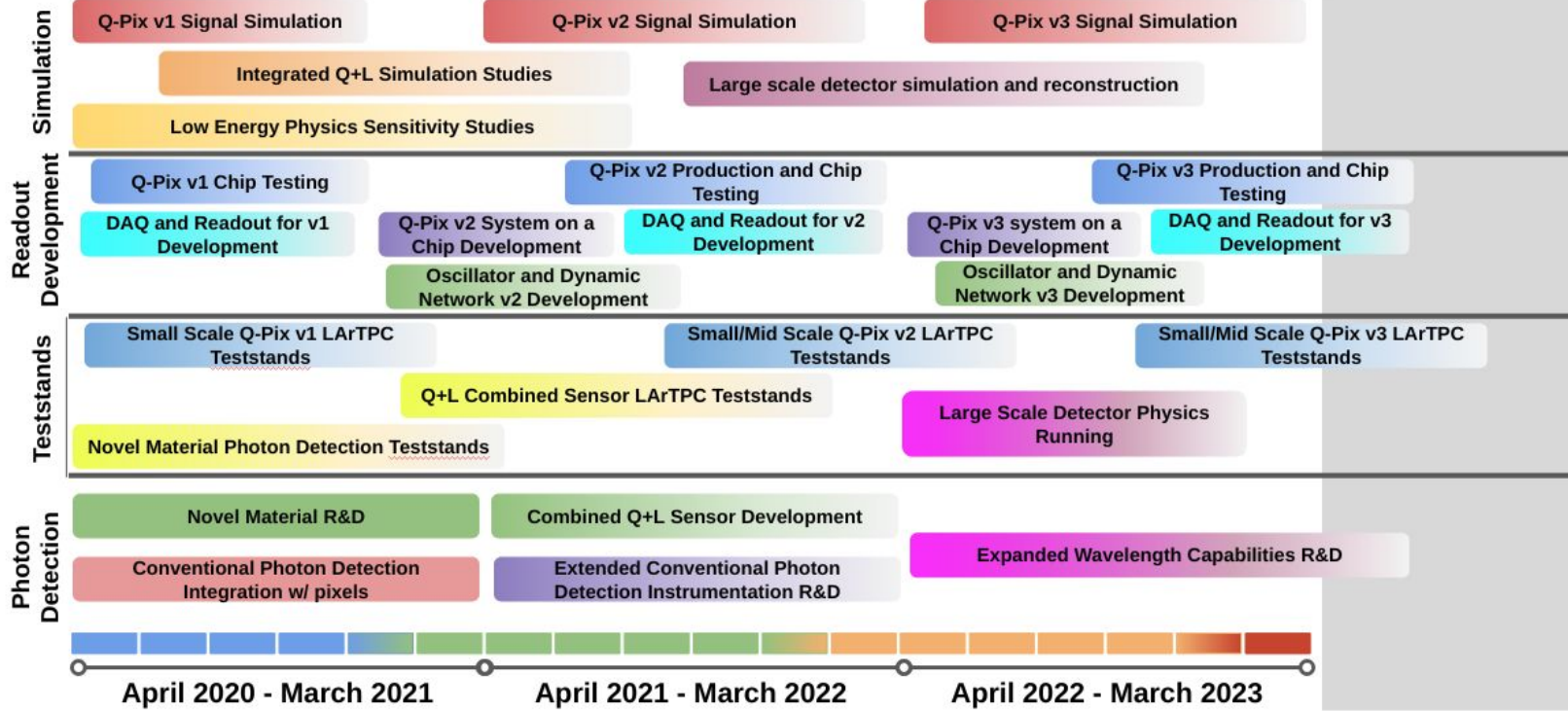




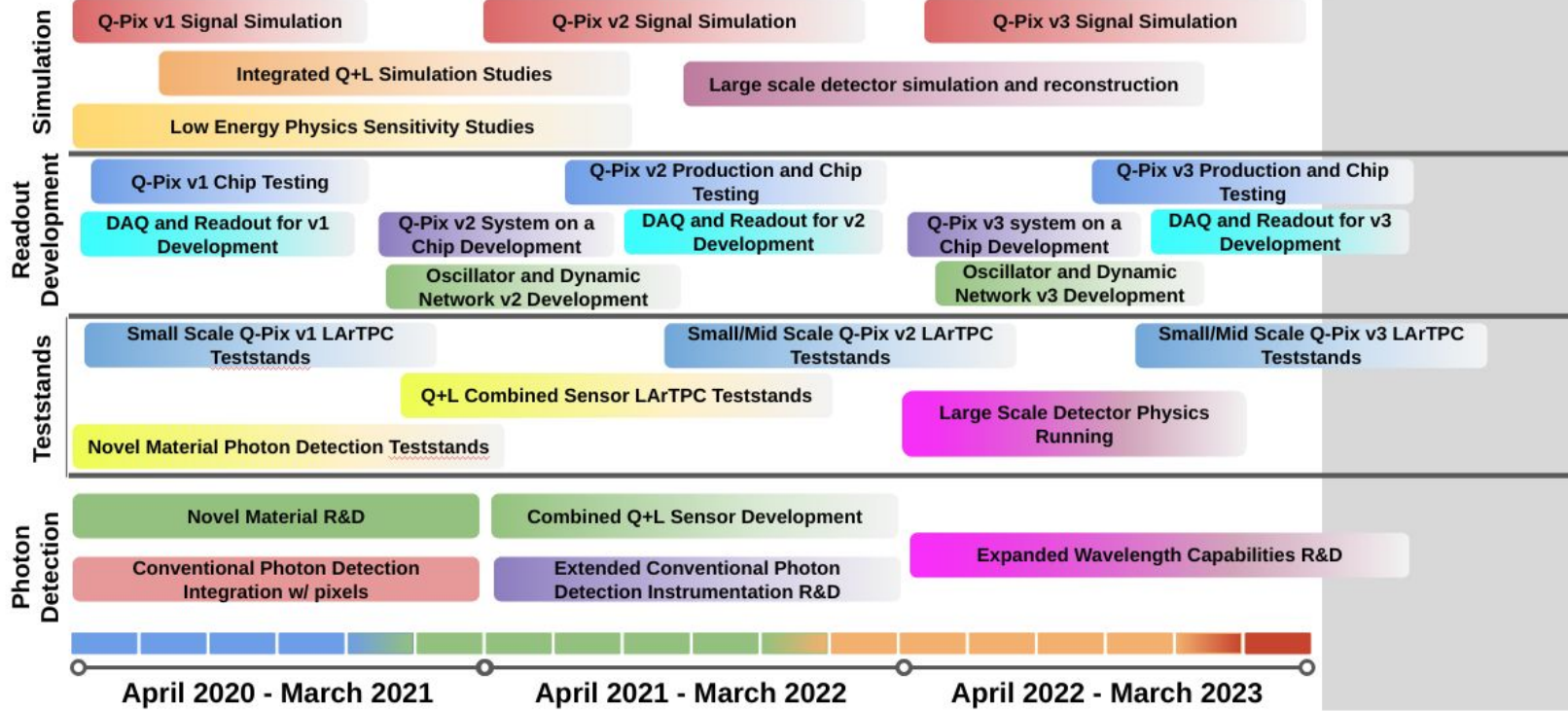
In addition to exploring some of the “blue sky” ideas, we had put a plan to explore conventional photon detection integration into Q-Pix readout design

This is likely something that naturally fits with our national lab partners





- Here is the full three year schedule we laid out in our proposal
- As you can see, this is an ambitious plan to execute on, but we are off to a good start
- Schedules like this remind me of a famous quote....



Make no little plans; they have no magic to stir people's (men's) blood and probably themselves will not be realized. Make big plans; aim high in hope and work, remembering that a noble, logical diagram once recorded will never die, but long after we are gone be a living thing, asserting itself with ever-growing insistency.

-Daniel Burnham

Let us make no little plans....

- **Let's tackle the next two days and the subsequent coming weeks with the ambition to realize what we can of these goals**
 - We are awaiting an outcome from the DOE review which we hope will match our ambition
- **Critical next step we need to be working toward is the Q-Pix Whitepaper**
 - This will require coordination and input from across the consortium
- **We'll pause here for discussion...**

Introduction to the UTA Team

- **Two PI's**
 - Dave Nygren (Chief Trouble Maker)
 - Jonathan Asaadi (Executive Email Sender)
- **One Graduate Student**
 - Formally Hunter Sullivan (graduated Dec 2019)
 - Now Austin McDonald (hopefully Dr. McDonald very soon)
- **Two Undergraduates**
 - Youstina Abraham (Electronics in the lab)
 - Abbey Raymond (amorphous Selenium)

