# AF4 (Multi-TeV Colliders) Timeline to Final Snowmass Report

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# A Couple Key Points...

AF4 is on focus is on the Machine Concept Whitepapers

- We request that Machine Concept POCs coordinate with the technology whitepaper submitters
  - Cross-referencing with “supporting” whitepapers will help us coordinate across the full range of AF submissions
  - Will help us identify critical R&D connections to highlight and cross-reference in the AF4 portion of the report
  - For reference, the full list of the topical groups is on the next slide
- The timeline for generation of the report envisions significant back and forth with the Machine Concept POCs in order to deliver a robust set of inputs to the HEP community

Snowmass 2021

| Topical Group | | Co-Conveners | | | |
|---|---|---|---|---|---|
| **AF1** | Beam Physics & Acc. Education | Mei Bai (SLAC) | Zhirong Huang (SLAC) | Steve Lund (MSU) | |
| **AF2** | Accelerators for Neutrinos | John Galambos (ORNL) | Bob Zwaska (FNAL) | Gianluigi Arduini (CERN) | |
| **AF3** | Accelerators for EW/Higgs | Goerg Hoffstaetter (Cornell) | Qing Qin (IHEP) | Frank Zimmermann (CERN) | Angeles Faus-Golfe (IN2P3) |
| **AF4** | Multi-TeV Colliders | Mark Palmer (BNL) | Nadia Pastrone (INFN) | Jingyu Tang (IHEP) | Alexander Valishev (FNAL) |
| **AF5** | Accelerators for PBC & Rare Processes | Mike Lamont (CERN) | Richard Milner (MIT) | Eric Prebys (UC Davis) | |
| **AF6** | Advanced Acc. Concepts | Ralph Assmann (DESY) | Cameron Geddes (LBNL) | Mark Hogan (SLAC) | Pietro Musumeci (UCLA) |
| **AF7** | Accelerator Technology | | | | |
| | RF | Emilio Nanni (SLAC) | Sergey Belomestnykh (FNAL) | Hans Weise (DESY) | |
| | Magnets | Susana Bermudez (CERN) | Gianluca Sabbi (LBNL) | Sasha Zlobin (FNAL) | |
| | Targets/Sources | Charlotte Barbier (ORNL) | Frederique Pellemoine (FNAL) | Yin-E Sun (ANL) | |

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# AF4 Report

In the Final Report on future facilities at very high energy scale, AF4 aims to present

- Potential machine routes
- Timelines
- R&D requirements
- Common issues (e.g. energy efficiency and cost)

The Report will be a summary of the White Papers and other input such as communication with synergistic topical groups.

The proposed structure of White Papers reflects the AF4 vision for the Final Report. However, each team can alter it as relevant.

# Main Aspects / Chapters

1. Design Overview
2. Technology Requirements
3. Staging options and upgrades
4. Synergies with other concepts and/or existing facilities

# Design Overview

## 1.1. Status of design

Possible classification categories include:  concept-only, pre-CDR (with significant, but not end-to-end design work available), CDR, TDR, other.

# Design Overview

## 1.2. Performance matrix

Identify the key limiting physical and technological factors in the following main areas

- Attainable energy
  - Acceleration rate and RF power.
  - Magnet technology: conductor, field quality, quench protection, cost.
  - Power consumption
- Attainable luminosity and luminosity integral
  - Beam brightness issues
  - Beam intensity/power issues
  - Luminosity integral (MDI limitations, rep. rate, reliability, etc.)
- Injector and driver systems
- Facility scale
- Power requirements

# Design Overview

## 1.3. Design summary

Description of and references for the detailed design as it presently exists

## 1.4. Challenges

- Beam physics
- Machine design
- Required key technologies
- Environmental Impacts

# Technology Requirements

2.1. Technology Readiness Assessment

2.2. Required R&D

2.3. Required and Desirable Demonstrators

A list of technology R&D LOIs related to each machine concept is included. We ask the machine coordinators to integrate inputs from these LOIs into section 2 of the document.

# Staging options and upgrades

3.1 Energy upgrades

3.2 Luminosity upgrades

3.3 Experimental system upgrades

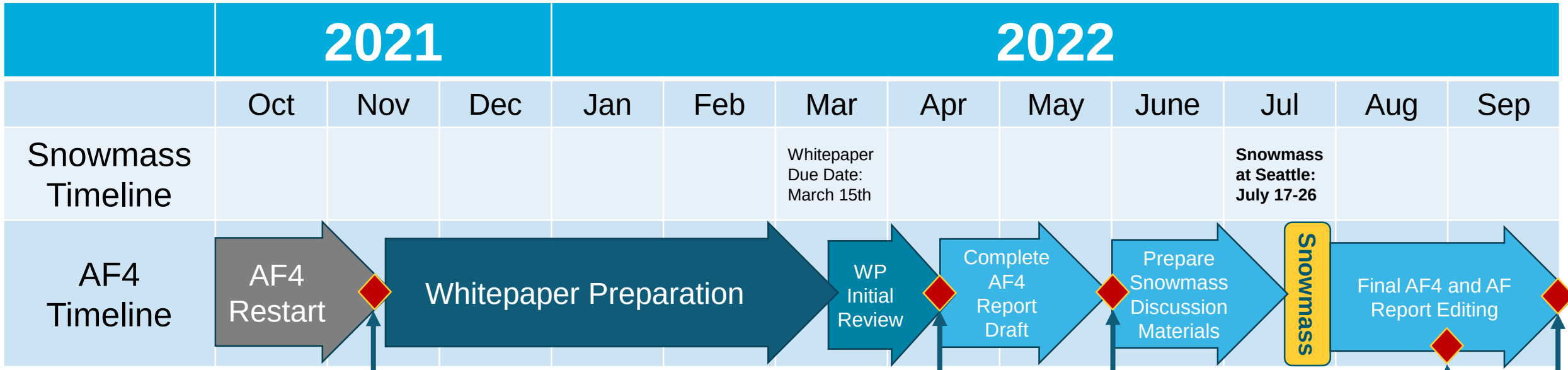
# Synergies with other concepts or existing facilities

4.1 Synergies on machine technologies

4.2 Synergies on detector technologies

4.3 Synergies on conventional facilities and green power

# Snowmass Restart:
## Snowmass Day – September 24, 2021




AF4 Whitepaper Meeting w/POCs Nov. 11, 2021

April 15: Requests for Clarification (if needed)

May 30:
1. Preliminary Draft Circulated to POCs for Comment
2. Executive Summary Sent to AF Conveners to Incorporate into Snowmass Meeting Documents

August 31: Request POC Comments

Final Reports Due September 30, 2022