

# **Cavities and Cryomodules**

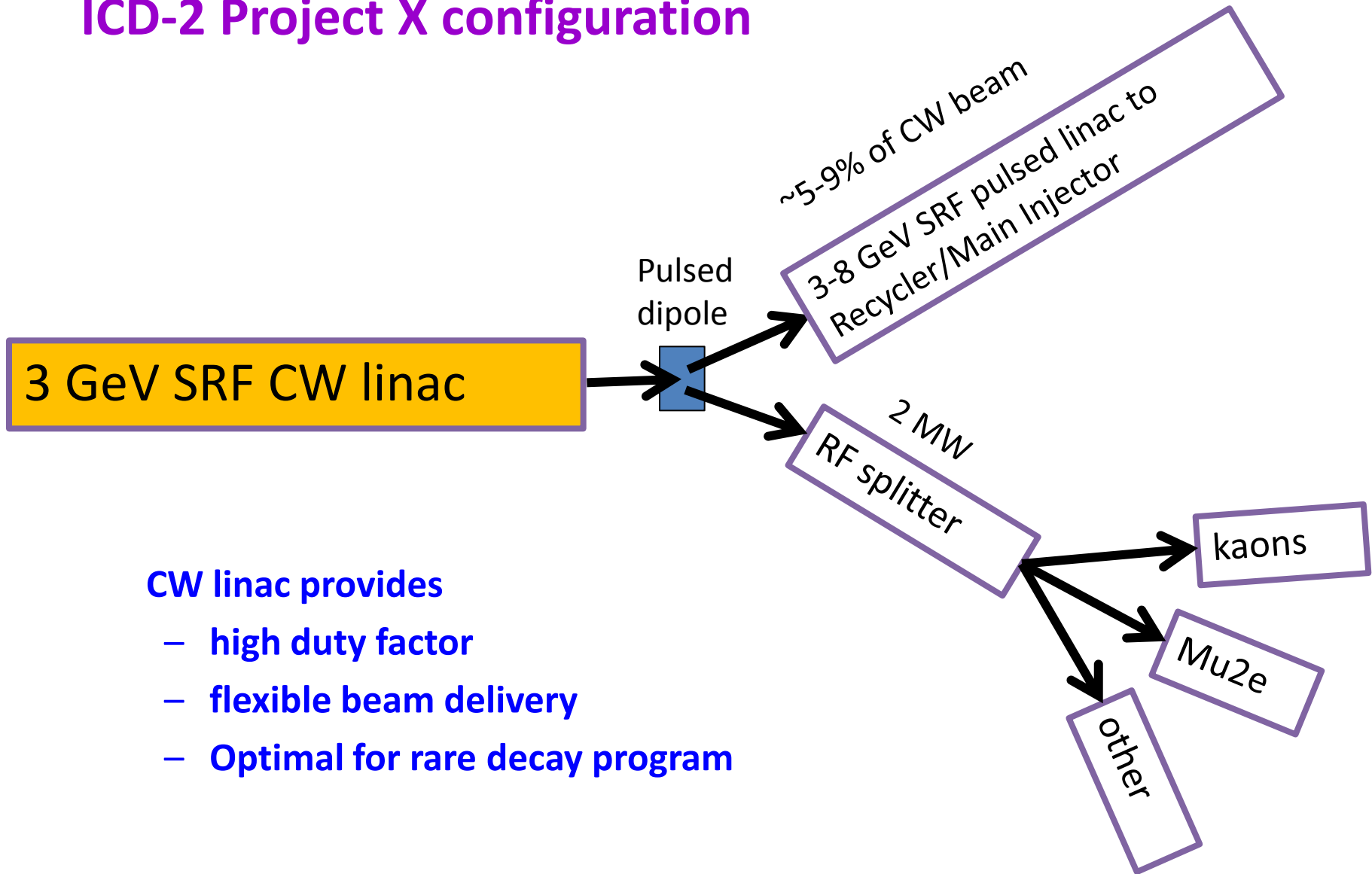
## **Introduction to WG2 and Design Status Overview**

Mark Champion  
Project X Collaboration Meeting  
September 8-9, 2010



Working Group Session 1 - Hermitage			
11:00	0:20	Cavities & Cryomodules design status overview	Mark Champion
11:20	0:20	Cavities & Cryomodules RD&D Plan	Bob Kephart
11:40	0:20	325 MHz Cavities - Report on first dressed cavity test	Bob Wagner
12:00	0:20	Cavity processing plans	Allan Rowe & Mike Kelly
12:20	0:10	Discussion	all
12:30		BREAK	
Working Group Session 2 - Hermitage and 1W			
13:30	0:20	Microphonics (with Linac Integration at 1W)	Matthias Liepe
13:50	0:20	LLRF / Microphonics (with Linac Integration at 1W)	Brian Chase
14:10	0:10	<i>** Move to Hermitage **</i>	
14:20	0:20	325 and 650 MHz cavity electromagnetic designs	Slava Yakovlev
14:40	0:20	325 and 650 MHz cavity mechanical designs	Mike Foley
15:00	0:20	650 MHz cavity design concepts	Bob Rimmer
15:20	0:10	Discussion	all
15:30		BREAK	
Working Group Session 3 (with Cryogenics and Linac Integration at 1W)			
16:00	0:20	Cryogenic segmentation	Jay Theilacker
16:20	0:20	Cryomodule design concepts	Tom Peterson
16:40	0:20	650 MHz cryomodule design concepts	Bob Rimmer
17:00	0:20	RF Coupler design concepts (optional)	Sergey Kazakov
17:20	0:10	Discussion	all
17:30		END	

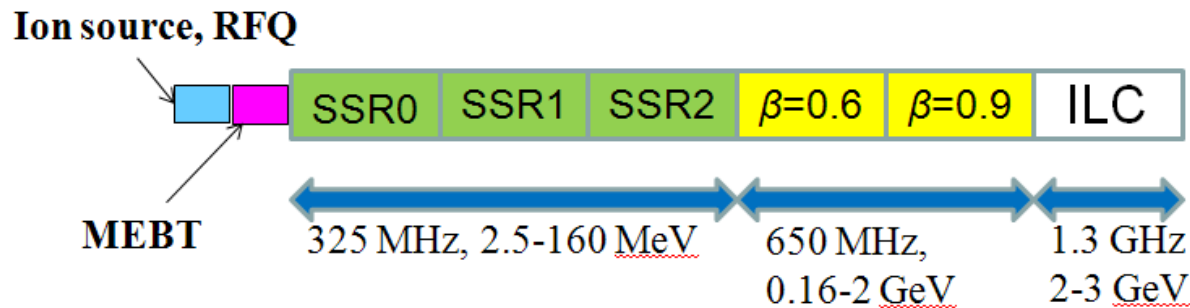
# ICD-2 Project X configuration



## CW linac provides

- high duty factor
- flexible beam delivery
- Optimal for rare decay program

## Concept of 3 GeV, 3 MW CW linac:



- ion source,
- RFQ,
- medium energy beam transport (MEBT), including the chopper and bunching cavities,
- three sections based on 325 MHz Single-Spoke Resonators,
- two sections of 650 MHz elliptical cavities, and
- section of 1.3 GHz ILC (TESLA) type cavities.

## Break points and number of components (03.08.2010)

Section	Freq	Energy MeV	Number of cav/mag/CM	Type of
Re-bunching RT Cavity ( $\beta_G=0.11$ )	325	2.5	4	Pill-box cavity, triplet
SSR0 ( $\beta_G=0.11$ )	325	2.5-10	26/26/ 1	Single-spoke cavity, solenoid
SSR1 ( $\beta_G=0.22$ )	325	10-32	18 / 18/ 2	Single-spoke cavity, solenoid
SSR2 ( $\beta_G=0.4$ )	325	32-160	44 / 24 / 4	Single spoke cavity, solenoid
LB 650 ( $\beta_G=0.61$ )	650	160-520	42 / 21 / 7	5-cell cavity, doublet
HB 650 ( $\beta_G=0.9$ )	650	520-2000	96 / 12 / 12	5-cell cavity, doublet
ILC 1.3	1300	2000-3000	72 / 8 / 9	9-cell cavity, quad



- EM designs for all cavities
  - HOM couplers an open issue
- Engineering design for SSR-1 cavities
  - 2 prototypes have been tested in vertical dewar
  - 1 of 2 has been dressed and tested in horizontal test cryostat
  - 2 additional cavities in fabrication at IUAC (Delhi)
  - 10 additional cavities in fabrication at Niowave/Roark
    - First pair due end of calendar year
- Six beta 0.9 single-cell 650 MHz cavities out for bid
- Beta 0.6 single-cell cavities to be fabricated at JLab
- 88 ILC cavities total (44 received / 44 on order)
  - ILC R&D program, but funded through SRF and ARRA
- Cryomodule design work in early stages



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- What pressure stability will be achieved in the 2 K helium bath?
  - What is the optimal cryogenic system segmentation plan?
  - Do the 650 MHz cavities need HOM couplers?
  - What beam current shall we plan for in the cw and pulsed linacs?
    - 1 mA cw and 1 mA, 2 ms, 20 Hz?
  - What cryomodule configuration is optimal for 325 and 650 MHz sections?
    - bathtub (ANL, TRIUMF, FRIB), ILC/XFEL, or space-frame (SNS)
  - What range of Q values can be expected for the 650 MHz cavities?
  - Fundamental power coupler design choices
    - Fixed vs. variable coupling
    - One vs. two windows
  - Are the specifications for cavity  $dF/dP$  and Lorentz-force detuning coefficients appropriate?
  - Where will the cavities undergo chemistry and test preparation?
  - Shall we eliminate the 1.3 GHz section of the CW linac?