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Title: PROTON AND/OR H- LINAC

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PROTON AND/OR H- LINAC

Name of Linac	:	*LANSCE Linac* *
Function	:	*High intensity proton beams and H^- for Proton Storage Ring*
Institution and address	:	*Los Alamos National Laboratory, Los Alamos, NM 87545*
Person in charge	:	*Stanley O. Schriber*
Name of person supplying these data	:	*Frank E. Merrill, Earl W. Hoffman*

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HISTORY AND STATUS

Const. started : *02/1968* ; first beam : *06/1972*
Present status : *Operational*
Cost of facility : *57 MUSD (1968)*
Present linac staff : *100 (inc. beam delivery)*
Present yearly operat. time : *3600* h

LINAC PARAMETERS

H^- Ion Source

Type : *H^- Converter type surface Plasma Source*
Output : *17* mA at *80* keV
Pulse length : *825* μs; rep. rate : *120* Hz

H^- Pre-accelerator (including RFQ)

Types : *CW* ; lengths : m
Output : *17* mA at *750* keV
Normalized emittance : *0.2* π mm-mrad

H^- Longitudinal Matching

Type : *2 Bunchers*
Mod. *3* keV; drift *4714* mm at *201* MHz
16 keV; drift *1795* mm at *201* MHz

H^+ Ion Source

Type : *Duo-plasmatron*
Output : *30* mA at *30* keV
Pulse length : *825* μs; rep. rate : *120* Hz

H^+ Pre-accelerator (including RFQ)

Types : *CW* ; lengths : m
Output : *30* mA at *750* keV
Normalized emittance : *0.03* π mm-mrad

H^+ Longitudinal Matching

Type : *2 Bunchers*
Mod. *5* keV; drift *5853* mm at *201.25* MHz
16 keV; drift *1795* mm at *201.25* MHz

DTL Focusing System

No. elements : *135*
type : *Quad* order : *FODO*
Gradients : *74.0* to *5.0* T/m

SCL Focusing System

No. elements : *104*
type : *Quad* order : *FDO*
Gradients : *20.0* to *30.0* T/m

LINAC PERFORMANCE

		Normal Operation	Max, or Design	
Energy	:	*800*	*800*	MeV
Mean acc. rate	:	*1.0*	*1.0*	MeV/m
ΔE/E (FWHM)	:	*0.1*	*0.1*	%
H+ Beam current	:	*17 mA*		mA peak
H+Norm. emit. (1σ)	:	*0.3*		π mm-mrad
H^- Beam current	:	*11 mA*		mA peak
H^- Norm. emit. (1σ)	:	*0.3*		π mm-mrad

	DTL	SCL
Total linac length (m)	*62*	*731*
No. of tanks	*4*	*104*
Tank diameters (m)	*0.9*	*0.26*
No. drift-tubes / cells	*165*	*4960*
Drift-tube lengths (mm)	*48-373*	*NA*
Drift-tube dias (mm)	*160-180*	*NA*
Gap/cell length	*0.16-0.4*	*NA*
Aperture dias	*15 to 30.0*	*37.8 to 44.5*
RF frequency(ies) (MHz)	*201.25*	*805*
Field modes	*TM010*	*TM010*
Eff. shunt imps (MΩm)	*50-70*	*25-38*
Q	$60\text{-}75 \times 10^3$	$18\text{-}25 \times 10^3$
Filling time (μs)	*150*	*15*
Equilibrium phases	*26°*	*31°-42°*
RF rep. rate (Hz)	*120*	*120*
RF pulse (μs)	*1035*	*985*
Beam rate (Hz)	*120*	*120*
Beam pulse (μs)	*825*	*825*
RF power peak (MW)	*3.0*	*1.25*
RF power mean (MW)	*0.26*	*0.09*

OTHER RELEVANT INFORMATION

* *Los Alamos Neutron Science Center*

References

[1] *R.E. O. Ericson, V.W. Hughes and D.E. Nagle, "The Meson Factories", (University of California Press, Los Angeles, 1991)*

[2] *M. Stanley Livingstone, "LAMPF A Nuclear Research Facility", LA-6878-MS, September 1977*

[3] *M. Stanley Livingstone, "Origins and History of the Los Alamos Meson Physics Facility", LA-5000*