

LIST OF ABBREVIATIONS

Abbreviation	Details
3D	Three Dimensional
A	Ampere
A-K	Anode-Cathode
DC	Direct Current
DEW	Directed Energy Weapon
EM	Electromagnetic
EMP	Electromagnetic Pulse
FEL	Free Electron Laser
FFT	Fast Fourier Transform
GHz	GigaHertz
HPEM	High Power Electromagnetic
HPM	High Power Microwave
Hz	Hertz
IREB	Intense Relativistic Electron Beam
J	Joules
KA	Kilo Ampere
KV	Kilo Volt
LINAC	Linear Accelerator
MA	Mega Ampere
MHz	Mega Hertz
MILO	Magnetically Insulated Line Oscillator
MITL	Magnetically Insulated Transmission Line

MW	Megawatt
NRL	Naval Research Laboratory
ns	Nanosecond
PIC	Particle-In-Cell
RBWO	Relativistic Backward Wave Oscillator
RF	Radio Frequency
RR	Resonant Reflector
SCO	Split Cavity Oscillator
SWS	Slow Wave Structure
TE	Transverse Electric
TM	Transverse Magnetic
VC	Virtual Cathode
VIRCATOR	Virtual Cathode Oscillator

LIST OF SYMBOLS

Symbol	Details
R	Resistance
L	Inductance
C	Capacitance
Q	Quality factor
ω	Resonant frequency
I_t	Total current
\bar{t}	Normalized time
I_0	Initial beam current
s	Norm factor
A	Amplitude of the induced gap voltage
φ	Phase of the induced gap voltage
ϕ_w	Steady state value to saturate the induced voltage
κ	Nonlinear saturation coefficient
p	Electron momentum
p_0	Initial electron momentum
\bar{p}	Normalized momentum
B	Self-magnetic field
e	Charge of the electron
v	Velocity of the electron
m	Mass of the electron
c	Speed of the light
E	RF electric field
E_0	Peak field amplitude
θ	Initial phase condition of the electric field
g	Grid spacing in the modulation cavity
f	Frequency
γ_0	Initial relativistic mass factor
γ	Relativistic mass factor
V_{ak}	Cathode voltage
V_{pa}	Post-acceleration voltage
ζ	Ratio of post-acceleration voltage to the cathode voltage
W_f	Kinetic energy
τ	Transit time of the electron
η	Electronic efficiency
I_b	Total beam current

W_{beam}	Total kinetic energy provided by the beam
V	Total DC potential
M	Coupling coefficient
V_{gap}	Gap voltage developed in the modulation cavity
Z	Impedance of the cavity
β_0	RF phase propagation constant
r_c	Cathode radius
r_m	Main cavity radius
E_S	Energy stored in the cavity
P_c	Power coupled in from the RF cavity
P_d	Power dissipated out from the RF cavity
H_{gr}	Normalized growth rate
k_z	Wavenumber
λ	Wavelength
U	Electromagnetic energy
ω_p	Plasma frequency
\mathcal{F}	Field enhancement factor
X	Normalized static potential
σ	Surface density of the beam
ϵ_0	Permittivity of the free space
j	Current density
H	RF energy of the cavity
ϕ	Electrostatic potential
γ_{inj}	Relativistic mass factor at the first grid injection position
I_{sc}	Space charge limiting current
I_s	normalized threshold current