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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>								<b>DATE</b> February 2000	
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E, Defense-Wide/BA2							<b>R-1 ITEM NOMENCLATURE</b> Medical Free Electron Laser <b>PE 0602227D8Z</b>		
<i>COST(In Millions)</i>	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	13.930	11.525	15.029	4.634	4.611	4.703	4.796	Continuing	Continuing
MFEL/P483	13.930	11.525	15.029	4.634	4.611	4.703	4.796	Continuing	Continuing

**(U)     A. Mission Description and Budget Item Justification**

**(U)     BRIEF DESCRIPTION OF ELEMENT**

(U)The MFEL program seeks to develop advanced, laser-based applications for military medicine and electronic materials research. Free electron lasers (FELs) provide unique pulse features and tunable wavelength characteristics that are unavailable in other laser devices. Thus, FELs broaden the experimental options for the development of new laser-based medical technologies.

(U) The majority of this program is focused on developing advanced procedures for rapid diagnosis and treatment of battlefield-related medical problems. Specific applications under investigation include soft tissue repair, hard tissue surgery, therapies for thermal and chemical burns, warfighter vision correction, and enhanced medical imaging. Laser applications will be clinically tested in unique program medical centers, leading to Food and Drug Administration (FDA) approval. There is high potential dual use for civilian medicine. Thus far, more than 20 clinical procedures have been developed in several medical specialties, including ophthalmology, orthopedics, thermal and chemical burn repair, and neurosurgery.

(U)A small part of this program is focused on electronic materials research. In this research, the high energy FEL beam is exploited for improved processing applications including more effective microstructure, surface cleaning and modification of transport properties of microelectronic substrates

(U) The program is executed extramurally. Performers include 5 major medical centers and approximately 10 applications groups. Awards are made competitively, following solicitation and peer review, for performance periods of up to 3 years. The program emphasizes the use of interdisciplinary teams of physicians, physicists, biologists, and engineers and collaborative interactions among the major MFEL centers.

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(U) **Project Number and Title: P483 MFEL**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY1999 Accomplishments:**

(U)Research on surgery of the eye and the brain, on monochromatic X -ray imaging, and on improved electronic materials continued at Vanderbilt University. FDA approval was received clearing the way for the first human surgeries to be performed with an FEL in FY2000.

(\$ 3.100 Million)

(U)Research on surgery of the eye, the brain, the skin, nerves and bone continued at Duke University. Performance of the vacuum ultraviolet (UV) laser was enhanced and the preclinical research facility was completed.

(\$ 3.155 Million)

(U)Research on surgical applications of lasers in wound repair, ophthalmic surgery, photodynamic therapy, and burn treatment continued at Mass General Hospital. Collaborations were initiated with the Army Institute of Chemical Defense and the Army Institute of Surgical Research on burn treatment.

(\$ 3.074 Million)

(U)Research on wound sterilization and bone surgery continued at the Beckman Laser Institute. Development of a new polarized light optical computed tomography imaging device for guiding laser usage by burn surgeons continued.

(\$ 1.100 Million)

(U)Research on biomolecular and tissue ablation characteristics of FEL radiation continued at Stanford University, as was research into the effects of FEL radiation on microelectronic and energetic materials.

(\$ 1.950 Million)

(U)Research to develop compact FELs, optical fibers and wave-guides for use in hospitals and battlefield settings continued.

(\$ 1.551 Million)

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**(U) FY2000 Plans:**

(U)A competition for medical center awards was conducted during 1999 for awards beginning in FY2000. It is anticipated that the number of centers supported by the program will be reduced in number from five to four. Increased emphasis will be placed upon transition of research products for combat casualty care and military trauma centers by establishing collaborative projects between military medical sites and research centers funded under the program.  
(\$ 11.525 Million)

**(U) FY2001 Plans:**

(U) Newly competed center awards will be in place for their first full year of funding. Emphasis will continue to be on military relevant laser medicine, with increasing focus on endoscopic imaging for rapid battlefield diagnostics and on wound diagnostics and treatment. Studies of the special problems created by laser vision correction, created by a variety of special demands of military operations, will be enhanced, as will means to alleviate such problems. Military relevant medical procedures introduced under this program will continue to be evaluated by, and transferred to military medical centers, and the special capabilities and facilities available at such centers will be used extensively.  
(\$ 15.029 Million)

<b>(U) <u>B. Program Change Summary</u></b>	<b><u>FY1999</u></b>	<b><u>FY2000</u></b>	<b><u>FY2001</u></b>	<b><u>Total Cost</u></b>
Previous President's Budget	14.496	9.719	9.698	Continuing
Appropriated Value	0.000	12.000	0.000	Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed Undistributed Reduction	0.000	0.000	0.000	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	(.566)	(.177)	(.069)	
c. Other	0.000	(.298)	5.400	
Current President's Budget	13.930	11.823	15.029	Continuing

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**Change Summary Explanation:**

(U)    **Funding:**    FY 1999 reflects adjustments for reprogrammings. FY 2000 adjusts the program for inflation. FY 2001 reflects adjustments for inflation and programmatic changes.

(U)    **Schedule:**    N/A

(U)    **Technical:**    N/A

(U)    **C.    OTHER PROGRAM FUNDING SUMMARY COST:    N/A**

(U)    **D.    ACQUISITION STRATEGY: N/A**

(U)    **E.    SCHEDULE PROFILE:    N/A**

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