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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 1: Basic Research					R-1 Program Element (Number/Name) PE 0601103F I University Research Initiatives							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	157.079	164.991	158.859	0.000	158.859	161.914	165.083	168.302	171.668	Continuing	Continuing
615094: University Research Initiatives	-	157.079	164.991	158.859	0.000	158.859	161.914	165.083	168.302	171.668	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program supports defense-related basic research in a wide range of scientific and engineering disciplines relevant to maintaining U.S. military technology superiority. Research topics include, but are not limited to, transformational and high priority technologies such as nanotechnology, sensor networks, artificial intelligence and information fusion, smart materials and structures, quantum materials and processes for sensing, communication and computing, efficient energy and power conversion, and high-energy materials for propulsion and control. The program also enhances and promotes the education of U.S. scientists and engineers in disciplines critical to maintaining, advancing, and enabling future U.S. defense technologies. For example, the National Defense Science and Engineering Graduate (NDSEG) program awards fellowships to train U.S. citizens in science and engineering disciplines of military importance under a joint tri-Service and Office of the Assistant Secretary of Defense for Research and Engineering competitive scholarship program. Finally, this program assists universities in establishing superior instrumentation capabilities needed to improve the quality of defense-related research and education. A fundamental component of this program is the recognition that future technologies and technology exploitations require highly coordinated and concerted multi- and inter-disciplinary efforts. Efforts in this program have been coordinated through the Department of Defense (DoD) Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of program funds in this PE would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602102F, 0602201F, 0602202F, 0602203F, 0602204F, 0602602F, 0602605F, 0602788F, 1206601F, and 0602298F.

As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.

This program is in Budget Activity 1, Basic Research because this budget activity includes scientific study and experimentation directed toward increasing fundamental knowledge and understanding in those fields of the physical, engineering, environmental, and life sciences related to long-term national security needs.

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B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	147.923	154.991	158.859	0.000	158.859
Current President's Budget	157.079	164.991	158.859	0.000	158.859
Total Adjustments	9.156	10.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	15.000	10.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-5.844	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000
Congressional Add Details (\$ in Millions, and Includes General Reductions)					
Project: 615094: University Research Initiatives					
Congressional Add: Program Increase - Antenna Research					
Congressional Add: Program Increase					
Congressional Add: Program Increase - Basic Research					
Congressional Add Subtotals for Project: 615094					
Congressional Add Totals for all Projects					
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2018	FY 2019
Title: Multidisciplinary University Research Initiative				80.831	84.445
Description: Promote fundamental, multi- and interdisciplinary science and engineering research projects involving multiple principle investigators.					
FY 2019 Plans: Continue to fund competitive research grants at U.S. universities that focus on significantly expanding the basic knowledge of Air Force relevant science and technology areas, not normally achievable in smaller funded, single investigator awards. Support and recognize superior academic researchers in the early stages of their careers through the Presidential Early Career Award for Scientists and Engineers (PECASE) program. Continue funding of multi-disciplinary programs initially awarded in prior years.					
FY 2020 Plans:					

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Continue funding competitive research grants at U.S. universities that focus on significantly expanding the basic knowledge of Air Force-relevant science and technology areas, not normally achievable in smaller funded, single investigator awards. Support and recognize superior academic researchers in the early stages of their careers through the PECASE program. Continue funding of multi-disciplinary programs initially awarded in prior years. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increased compared to FY 2019 by \$2.107 million. Funding increased due to added emphasis in multidisciplinary university research.				
Title: Science and Engineering Education Description: Support post-graduate, graduate, and undergraduate education in science and engineering disciplines at U.S. universities. FY 2019 Plans: Continue to award highly competitive National Defense Science and Engineering Graduate (NDSEG) fellowships. Support competitive awards for graduate and undergraduate research experiences, including those established under the Awards to Stimulate and Support Undergraduate Research Experiences (ASSURE) program. Continue funding for awards initiated under prior year DoD programs. FY 2020 Plans: Continue to award highly competitive NDSEG fellowships. Continue to support competitive awards for graduate and undergraduate research experiences, including those established under the ASSURE program. Continue funding for awards initiated under prior year DoD programs. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increased compared to FY 2019 by \$1.389 million. Funding increased due to added emphasis in science and engineering education.		47.528	55.652	57.041
Title: Research Instrumentation Description: Enhance scientific and engineering research through advanced education infrastructure and instrumentation at U.S. universities. FY 2019 Plans:		14.258	14.894	15.266

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019
Continue to award grants on a competitive basis under the Defense University Research Instrumentation Program (DURIP) to U.S. universities to acquire state-of-the-art, high technology instrumentation and infrastructure to enhance research and educational capabilities.			
FY 2020 Plans: Continue to award grants on a competitive basis under the DURIP to U.S. universities to acquire state-of-the-art, high technology instrumentation and infrastructure to enhance research and educational capabilities.			
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increased compared to FY 2019 by \$0.372 million. Justification for the increase is described in the plans above.			
Accomplishments/Planned Programs Subtotals		142.617	154.991
	FY 2018	FY 2019	
Congressional Add: Program Increase - Antenna Research	4.821	0.000	
FY 2018 Accomplishments: Conducted Congressionally directed effort.			
FY 2019 Plans: N/A			
Congressional Add: Program Increase	9.641	0.000	
FY 2018 Accomplishments: Conducted Congressionally directed effort.			
FY 2019 Plans: N/A			
Congressional Add: Program Increase - Basic Research	0.000	10.000	
FY 2018 Accomplishments: N/A			
FY 2019 Plans: Conduct Congressionally directed effort.			
Congressional Adds Subtotals	14.462	10.000	
D. Other Program Funding Summary (\$ in Millions)			
N/A			
Remarks			
E. Acquisition Strategy			
N/A			

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F. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.		