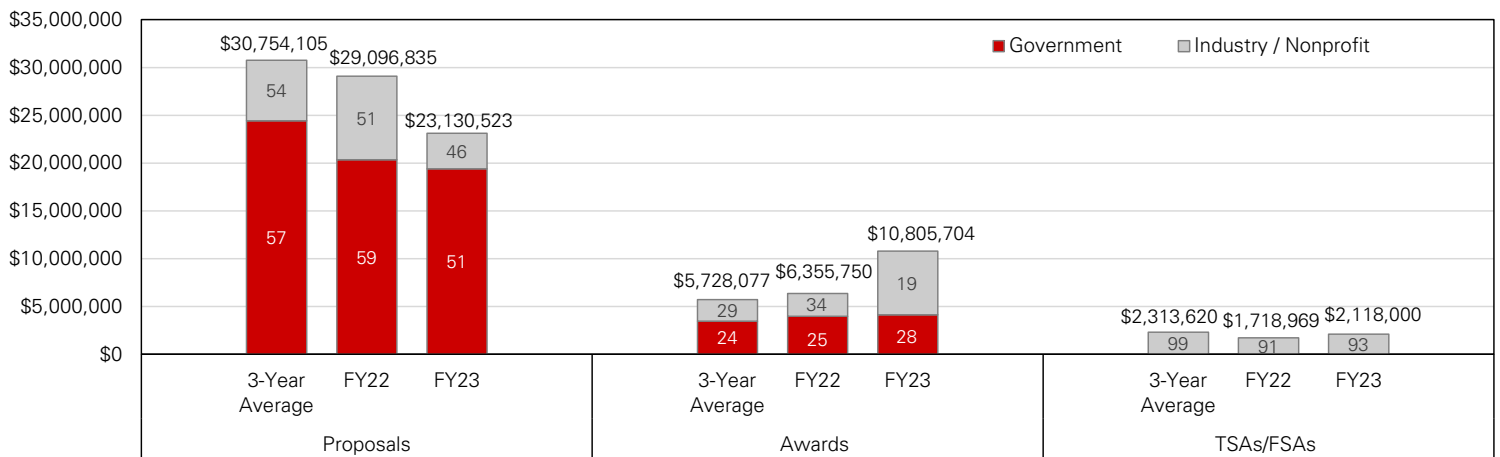


The research programs in the Wilson College of Textiles at NC State University are innovative, life-saving, creative, global and thriving. The college also provides tech service to all stakeholders and supports the economic development of the State and beyond. This newsletter gives a brief overview on the research and tech service activities of the faculty, staff and students during the fourth quarter of Fiscal Year 2023.

## FY23 vs. FY22 vs. Three-Year Average (Q1 - Q4)

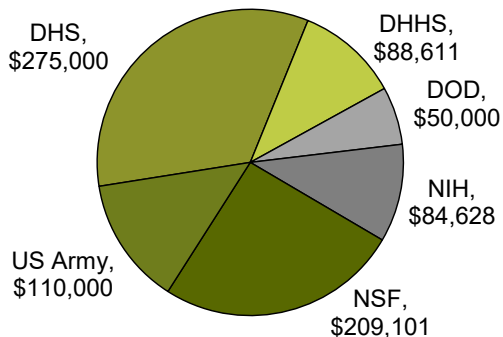


## NUMBERS TO DATE (FY23 Q4)

### Research Awards Received (\$1,682,432)

- Federal: \$817,340 | - DHS, DHHS, DOD, NIH, NSF, US Army
- Industry/Nonprofit: \$865,092 | Istanbul Technical University, ROSF, SCRIF, Wildfire Conservancy

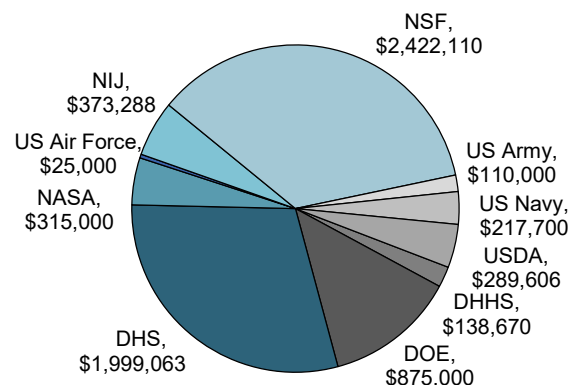
### FY23 Q4 Federal Awards by Agency



### Research Proposals Submitted (\$7,417,190)

- Federal: \$6,765,437 | DHHS, DHS, DOE, NASA, NIJ, NSF, US Air Force, US Army, US Navy, USDA
- Industry/Nonprofit: \$651,753 | Center for Human Health and the Environment, Chancellor's Innovation Fund, Data Science Academy, FRPD, Istanbul Technical University, National Research Foundation of Korea, RISF, ROSF, SCRIF

### FY23 Q4 Federal Proposals by Agency



## NUMBERS TO DATE (FY23 Q4) Cont.

### Inter-college Research Proposals (6)

- Wilson College share: \$1,835,332
- With CALS, COE, COS, CVM

Inter-dept./unit Research Proposals (4) \$2,732,097

Inter-dept./unit Research Awards (4) \$1,034,897

### Graduate Student Support

- 52 Ph.D. Student RAs (Avg Stipend: \$20,078.23 / year)
- 12 M.S. Student RAs (Avg Stipend: \$14,804.17 / year)

## RESEARCH AWARDS AT OR ABOVE \$50,000 (FY23 Q4)

1. Robert Ormond, Warren Jasper, Cassandra Kwon, Marc Mathews, Wildfire Conservancy (CAL FIRE), \$500,000. UNSDG 3
2. Robert Ormond, Cassandra Kwon, Warren Jasper, Marc Mathews, Wildfire Conservancy (DHS), \$275,000. UNSDG 3
3. Yang Zhang, NSF, \$209,101. UNSDG 9
4. Xiangwu Zhang, Istanbul Technical University, \$195,195. UNSDG 7
5. Rong Yin, Kristin Thoney-Barletta, Amanda Mills, Warren Jasper, Yang Liu, Andre West, SCRIF, \$150,000. UNSDG 3
6. Emiel DenHartog, Andre West, Kun Luan, Amanda Mills, Natick, \$110,000. UNSDG 9 & 12
7. Yang Zhang, University of Miami (NIH), \$84,628. UNSDG 3
8. Marc Mathews, Luna Innovations, Inc. (DOD), \$50,000. UNSDG 3

Note: UNSDG stands for United Nations Sustainable Development Goals.

## RESEARCH HIGHLIGHTS

The Faculty Research and Professional Development (FRPD) program is a funding partnership between the Office of Research and Innovation (ORI) and the 10 academic colleges. The program was established to assist faculty in initiating research and professional development activities. The primary objective of this program is to provide individual investigators seed funding to pursue larger awards and grants from outside agencies. The following two projects (\$10,000 each) were selected for funding in FY 2023.

**Wearable Evaporation-Driven Power Generators (Tom Schroeder).** Harvesting electricity from the evaporation of sweat is one possible approach to powering wearable electronic devices. Evaporation can drive the movement of water within micro- and nano-porous materials such as textiles. If the textile surfaces are sufficiently charged, this flow can give rise to usable or storable electrical energy in the form of so-called “streaming currents.” Professor Tom Schroeder and his team are working to develop power generation schemes to situate in apparel, where water from sweat can already be found evaporating. This approach belongs to a family of techniques that take advantage of gradients and flows that already exist in the environment to generate electricity without consuming additional resources.



**Development of Switchable Fluorescent Dyes for the Functional Super-Resolution Fluorescence Microscopy of DNA Nanofiber (Yang Zhang).** Super-resolution fluorescence microscopy, a Nobel-Prize-winning nanoscopic imaging technique can potentially reveal the interplay of nanoscopic environment and DNA nanofiber packing on gene expression (aka epigenetics). Each human cell nucleus contains 3 billion base pairs of nucleotides (nt) that form DNA nanofibers with a theoretical linear length of 2 meters. To fit into the 10-um size of a nucleus, DNA fibers fold into higher-order chromatin structures and the degree of packing is inversely related to the transcription activity, which fundamentally drives life processes and potentially regulates disease etiology. The ultrastructures and the surrounding environments of DNA nanofiber, which fundamentally underline epigenetics are yet largely unknown. Professor Yang Zhang is working to develop new super-resolution microscopy tools to visualize the nanoscopic functions of DNA and help the epigenetic study of this profound and societally-important biomedical problem. Specifically, his team is designing and synthesizing functional fluorescent DNA labels that are tailor-designed for super-resolution microscopy to highlight individual DNA fibers and outline the nanoscale architecture it resides in live cells. electricity without consuming additional resources.

