New AFOSR magnetron may help defeat enemy electronics

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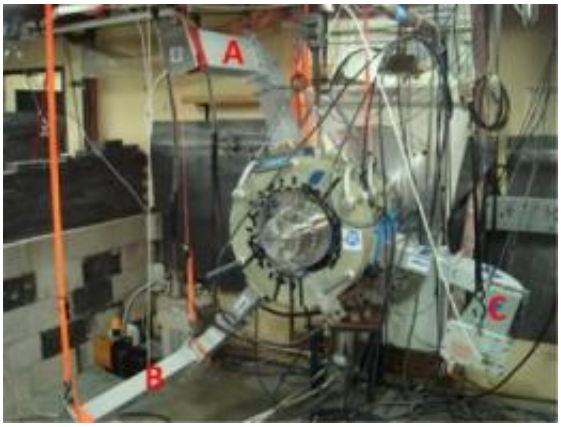

Researchers funded by the US Air Force Office of Scientific Research at the University of Michigan invented a new type of magnetron that may be used to defeat enemy electronics. A magnetron is a type of vacuum tube used as the frequency source in microwave ovens, radar systems and other high-power microwave circuits. Credit: Photo courtesy of the University of Michigan and the Air Force Research Laboratory

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According to Dr. Ron Gilgenbach, an AFOSR-sponsored researcher at

the University of Michigan, a new class of magnetrons was invented that holds the potential for more compact Department of Defense microwave sources with faster start-up, as well as higher peak and average power.

"This invention should make it possible to develop more compact magnetrons that operate at higher power and higher frequencies," said Gilgenbach. "Higher power magnetrons could be utilized to jam and defeat enemy electronics."

The magnetron has been vital to military radar systems since World War II. Over time the basic design of the magnetron has not changed much. However, the University of Michigan researchers have revolutionized the design of both conventional and inverted magnetrons by expanding the cathode (negatively charged electrode) and anode (positively charged electrode) area into a new type of magnetron, which permits higher current and larger area for heat dissipation in a more compact device.

This research has a significant impact on the Air Force's radar capabilities. The newly invented magnetron's higher frequencies have the potential to improve radar resolution. Additionally, the more compact packaging of the new magnetron could encourage airborne applications.

"This invention exploits some plasma physics principles that have been applied to this problem as well as an innovative, new geometry to overcome the physical limitations of conventional magnetrons," said Gilgenbach. "The vision is to explore both a high power version of the magnetron invention and a separate higher frequency (mm wave) embodiment."

AFOSR has been funding the research that led to this invention under the program direction of Dr. Robert Barker, Physics and Electronics program manager. Dr. Barker speaks highly of the University of

Michigan-led team, which includes co-inventors: R.M. Gilgenbach (UM), Y.Y. Lau (UM), Brad Hoff (formerly UM, currently at AFRL), David French (UM), and John Luginsland (NumerEx).

"The Michigan group led by Profs. Gilgenbach and Lau has long been a mainstay of AFOSR's high power microwave (HPM) research team," said Barker. "Not only is it internationally recognized for its scientific accomplishments as exemplified by this new invention, but this Michigan group also serves as an example for the rest of the university community. It has established active collaborations with AFRL counterparts and provided a steady stream of graduates to staff the ranks of the Air Force's HPM research and development establishment."

Source: Air Force Office of Scientific Research