

## North Carolina Museum of Art Announces Collaboration with Duke University

*Partnership offers art imaging and conservation research opportunities with new laser system*

**Raleigh, N.C.**—The North Carolina Museum of Art (NCMA) announces a collaboration with Duke University’s Center for Molecular and Biomolecular Imaging (CMBI) that brings new technological advances to the Museum’s Art Conservation Department. The partnership between NCMA conservators and Duke scientists offers art research opportunities with the use of two lasers: a new nondestructive pump-probe laser and an Erbium:YAG (Er:YAG) laser cleaning tool.

“This collaboration with Duke dovetails perfectly with the Museum’s initiative to share resources with local universities, bolstered by a research endowment from the Andrew Mellon Foundation in support of art scholarship and conservation science,” says William Brown, NCMA chief conservator. “The NCMA’s Art Conservation Center has had the privilege of working with this group of distinguished scientists from Duke, and we look forward to what the next year will bring.”

### Pump-probe laser imaging



Pump-probe laser imaging is a technique originally designed by Dr. Warren S. Warren, director of CMBI at Duke, to use in melanoma diagnoses. Through the collaboration between Duke and the NCMA, this technology can now be applied to art, allowing art conservators to better recognize the paint or other material used when the work was created. Paint pigments carry an identifiable molecular signature, meaning materials used by an artist can be identified through scientific analysis.

“Dr. Warren assumed that, just as with skin lesions, yellowed varnish and paint layers could be imaged by his laser to distinguish original paint from restoration, helping us understand the intended beauty of centuries-old paintings,” says Brown. Brown volunteered to provide the first work of art on which to use the pump-probe laser, the Museum’s 14<sup>th</sup>-century *Crucifixion* by Puccio Capanna (pictured left), hoping that the laser system may eventually identify the paint pigments and layering techniques Capanna used. It may also help confirm whether the painting was originally part of an altarpiece at the Vatican.

Pump-probe imaging can improve conservation and restoration by informing treatment choices to ensure that only old, degraded coatings are removed—not original paint. Additionally, this new imaging technology allows conservators to analyze works of art in a noninvasive way. While other methods of paint analysis can be useful, they may require the removal of a small paint chip or cross section. Pump-probe laser imaging avoids this entirely by providing nondestructive, three-dimensional, chemically specific images of various historical pigments and paint layering. In fact, the total power on the painting is less than what a common red laser pointer would emit. “Given that each work is irreplaceable, destroying even a very small part of the painting is a difficult choice for a conservator, who, like a doctor, is ethically obligated to do no harm,” Brown says.

Warren’s art-applied pump-probe analysis may also provide insight into the historical nature of a work of art by revealing where pigments came from. This information may help confirm details of a work of art’s origin and help authenticate the art, as laser analysis can distinguish a synthetic pigment from a natural one.

Finally, the research gives graduate students an opportunity to solve real-world problems through interdisciplinary inquiry: Duke will dedicate one Ph.D. candidate to work full time on the pump-probe imaging project.

### **Er:YAG laser cleaning tool**

As part of the collaboration between the NCMA and Duke, art conservators at the Museum have also been working with Duke scientists to use lasers in art-cleaning projects. NCMA conservators have the opportunity to train with Dr. Adele de Cruz, adjunct associate professor at Duke, with the Er:YAG laser (pictured right), which she invented about 15 years ago. The Er:YAG laser, often referred to as a "laser scalpel," allows art conservators to remove old, degraded varnish coatings from paintings and other works of art with a high amount of control and precision. "Paintings once considered impossible to clean by conventional methods can now be returned to their former glory," Brown explains.



### **Art + Science**

Museum conservators, Duke professors, and graduate students involved in the research projects all express a sense of respect and gratitude while exploring the other side of the collaboration, emphasizing that both science and art benefit from the research. Dr. Martin Fisher, assistant research professor at Duke, explains that knowledge gained from imaging art, such as how to identify different colors in complex mixtures, will be useful in identifying different biological tissues. Likewise, Tana Villafana, Dr. Warren's graduate student, says the interplay of art and science is subtle but important, citing a new way of thinking gained by working in an art lab.

Brown agrees, summarizing his experience with the collaboration thus far: "What's so satisfying for me is the interdisciplinary nature of this collaboration. I'm able to work with scientists from different fields and clearly benefit from their expertise by learning new scientific methodologies and gaining a greater understanding of the material nature of the art."

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### **About the North Carolina Museum of Art**

The North Carolina Museum of Art's permanent collection spans more than 5,000 years, from ancient Egypt to the present, making the institution one of the premier art museums in the South. The Museum's collection provides educational, aesthetic, intellectual, and cultural experiences for the citizens of North Carolina and beyond. The 164-acre Museum Park showcases the connection between art and nature through site-specific works of environmental art. The Museum offers changing national touring exhibitions, classes, lectures, family activities, films, and concerts.

The Museum opened West Building, home to the permanent collection, in 2010. The North Carolina Museum of Art, Lawrence J. Wheeler, director, is located at 2110 Blue Ridge Road in Raleigh. It is the art museum of the State of North Carolina, Pat McCrory, governor, and an agency of the Department of Cultural Resources, Susan Kluttz, secretary.