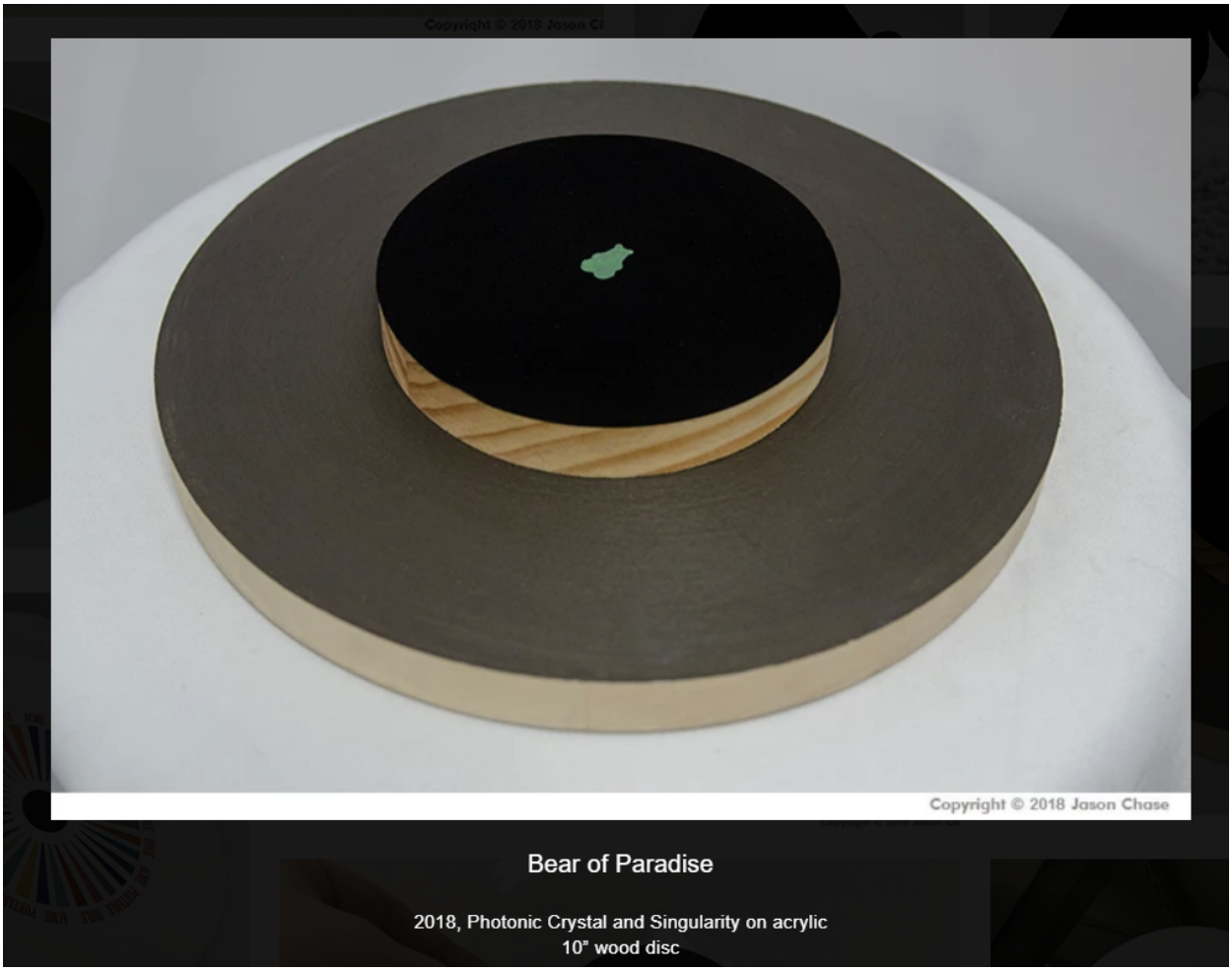
Bio-Inspired Art Science Collaboration (Boston Museum of Fine Art)

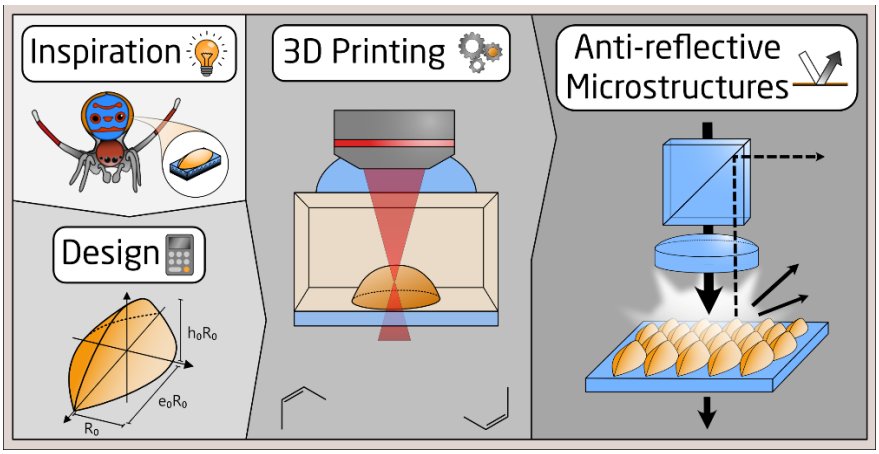
I published a series of papers showing that birds-of-paradise and peacock spiders, marvelous animals, have evolved clever optical surfaces which reflect almost no light. When professional artist Jason Chase read about my work in Scientific American, he reached out to collaborate with me. We met several times in his studio, where he worked with a unique ”super black paint” made by NanoLab in Cambridge, MA to create several sculptural and painted works of art. Together, we matched some of the exact wavelengths of color used by the super black animals (often, blue appears just adjacent to super black, likely due to how our rods not only process brightness but are also particularly sensitive to blue light. This is why nighttime appears awash in blue).

Jason Chase has, very sadly, since passed away. He left a strong positive imprint on the world through his art. Here are some of the pieces that came out of our art-science collaboration and were displayed at the Boston Museum of Fine Art:



Bio-inspired Sustainable Design

I wrote a paper showing that peacock spiders use a peculiarly-sized and -shaped microlens arrays to trap sunlight and increase the path length of light through the absorbing layer—which, for the male spiders, is a way to make nearby colors look impossibly bright (an evolved optical illusion). Parameter sweeps showed that the micro lens arrays in peacock spiders are optimally sized and shaped to reflect less, and absorb more, light (a physical tradeoff which is also relevant to solar panel design; McCoy et al. 2019). The super black spiders inspired new antireflective microarrays (Wetzel et al. 2021), and my work has been cited by dozens of engineering and technical papers on optics and thermal technology (Dou et al. 2021). Here I copy the design abstract from Wetzel et al. 2021:



Art-Science Talks

Skowhegan School of Painting and Sculpture. “Color, Material, and Emotion in Birds with Dr. Dakota McCoy.” **https://www.skowheganbird.club/birdclubblog/dakota-mccoy**

Promotional Art by Pallavi Sen:

“Color, Feathers, and the Evolution of Beauty.” Harvard Museum of Natural History, Adult Class on Bird Coloration. (2018) Cambridge, MA.