Abstract Submitted
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X-ray Fluorescence Spectroscopy of Pre-Federal American Currency[1] MARK RADDELL, KHACHATUR MANUKYAN, ANI APRAHAMIAN, MICHAEL WIESCHER, Department of Physics, University of Notre Dame, LOUIS JORDAN, Department of Rare Books and Special Collections, University of Notre Dame — X-ray Fluorescence Spectroscopy (XRF) was used to study 17th and 18th century Mexican, Potos, and Massachusetts silver colonial coins from the University of Notre Dames Rare Books and Special Collections. Using different configurations and devices, we have learned more about the limitations and optimizations of the method. We have developed a moveable stand that may be used for XRF mapping of coin surfaces. We created standard silver alloy materials for quantification of the elemental composition of the coins. Inductively coupled plasma (ICP) spectroscopy was applied to determine the precise composition of the standards for accurate and non-destructive analyses of the colonial coins. XRF measurements were performed using two different XRF spectrometers, in both air and vacuum conditions, as well as an x-ray beam tube of varying diameters from 2 mm, 1 mm, and 0.03 mm. We quantified both the major elements and the bulk and surface impurities for 90 coins. We are using PCA to look at possible correlations between compositions of coinage from different geographical regions. Preliminary data analyses suggest that Massachusetts coins were minted using silver from Latin American sources. These results are of great interest to historians in tracing the origins of the currency.

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Mark Raddell
Univ of Notre Dame

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