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Multiple techniques for cultural heritage study and the collaboration with the Brazilian museums

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Scientific investigations in the cultural heritage and objects of art are routinely performed in Europe and the United States a few decades ago, in Brazil we are currently increasingly using atomic and nuclear methods for this purpose. Since 2003 the Group of Applied Physics with accelerators of the Institute of Physics of the University of São Paulo has worked with various methodologies for characterization and analysis of cultural objects. The analysis methods include processes of imaging and techniques for elemental and compositional characterization. These methods used together allow the better understanding of the materials and techniques used in the creative process and manufacturing of the objects. In the processes of analysis are used as imaging techniques: Photos with visible light, reflectography Infrared, fluorescence radiation with ultraviolet light, images with tangential light and digitized radiography; that are used to examine and document the artistic and cultural heritage objects. In the determinations of the characteristic materials of the objects present in the collections, we used analyzes for determining the existing elements and chemical compounds in the surface layers of these. The techniques involve ion beam analysis such as Particle Induced X-Ray Emission, Rutherford Backscattering and currently Ion Luminescence. Extending further the possibility of analysis, it has been used the techniques of X-ray Fluorescence and Raman spectroscopy with portable equipment that can be used in museums themselves. The results of these analyzes are providing valuable information about the manufacturing process and provide new information of the objects and all this has allowed a new collaboration with different São Paulo museums such as Pinacoteca, Museum of Contemporary Art (MAC-USP), Paulista Museum, Museum of Archaeology and Ethnology (MAE-USP) and the Institute of Brazilian Studies (IEB-USP). Several works and studies are being carried out systematically in these institutions in different artworks in the museum's collections such as easel paintings, ceramic objects, papers, photos, etc. The information obtained are allowing the formation of a database about materials, pigments and manufacturing techniques of various artists. Particularly in the study of easel paintings the characterization of pigments in parallel with the imaging techniques has allowed to reveal the artist's creative process and has determined the palette used by the artist in one particular work. The purpose of this systematic study is to produce useful information to historians, curators, conservators and restorers for the expansion of knowledge in art history, but also in determining and defining the technical conditions and preservation of the cultural heritage material. The group of applied physics to the study of the historical and artistic heritage objects (NAP-FAEPAH) was formed in the University of São Paulo with collaboration of the different museums and institutions, and several works are been performed and will be presented and discussed.

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