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E I N L A D U N G

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V O R T R A G

von

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Molecular Sciences and Cultural Heritage

am

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Institut für Wissenschaft und Technologie in der Kunst
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Molecular Sciences and Cultural Heritage

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Molecular sciences can provide powerful support to solve problems in archaeological and art-historical studies or to suggest appropriate procedures for conservation and restoration. Recent technological developments in microelectronics and fibre optics have made available portable scientific instrumentation to carry out non-destructive *in-situ* measurements. This has enabled the Perugia Centre of Excellence "Scientific Methodologies applied to Archaeology and Art" (SMAArt) to assemble a mobile laboratory (MOLAB), which provides transnational access within the framework of the European project Eu-ARTECH. A recent extensive study by these techniques on the state of conservation of Michelangelo's *David* is reported and discussed. Additionally, scientific investigations offer the possibility to establish in great detail the painting techniques of old masters. In particular the studies carried out on the painters *il Perugino* and *Raffaello* will be reported. These Renaissance artists, besides using traditional pigments of the sixteenth century, also experimented with metal powders, such as bismuth or bronze, or minerals with metallic lustre, or even powders of transparent uncoloured glass, in the effort to reach more sophisticated chromatic effects.

Molecular Sciences, other than providing innovative compounds for the consolidation and the cleaning of artefacts of art-historical interest are with great relevance contributing to archaeological investigations for the study of executive techniques and their evolution. As an example, applications shall be presented of neutron diffraction to the study of Etruscan bronzes and the use of synchrotron radiation to the study of Renaissance ceramics. The peculiar optical properties of lustre are due to a high-density distribution of copper and silver nanoclusters within the first layer of the glaze. It is the presence of these nanoparticles that confers to the lustre its peculiar chromatic properties: brilliant metallic reflections, iridescence and changing effects. A surprising finding is that the ancient manufacturing technique for the lustre decorations is very similar to the techniques used today to prepare silver and copper nanoclusters dispersed in glassy media of interest in the field of optoelectronics.