

“Physical Sciences in the service of the future of our past: Lasers in the preservation of Cultural Heritage”

Séminaire général du Département de Physique de l'École Polytechnique

To date, it has been proven that physical sciences may well serve, the preservation of Cultural Heritage. In particular, the implementation of modern laser science is opening several exciting prospects both in terms of the level of understanding of the fundamental aspects involved and the practical diagnostics and restoration applications, which have been demonstrated [1]. Along these lines, laser plasma spectroscopy and the non-invasive laser induced fluorescence, and Raman spectroscopies have been proven successful in a range of applications for elemental or compound identification at a micron-level scale. Combinations of these techniques may provide complementary data, improving the quality of the information obtained. Laser spectroscopic techniques may also provide the possibility for the on-line monitoring and control of intervention processes during conservation. Furthermore, non-linear spectroscopic and imaging techniques in new wavelength regions e.g. in the THz spectral range, are currently emerging, paving the way to new challenging applications. Remote analysis by laser filaments propagating over long distances is another interesting development in this respect.

The use of lasers emitting pulses of nanosecond duration for cleaning applications is well established. Lately, femtosecond lasers also present interesting possibilities for demanding conservation cases (e.g. for the cleaning of sensitive materials, like those used in modern paintings). It is the extremely high spatial resolution of the ablation processes and the minimal thermal and photochemical effects which may be achieved by using femtosecond lasers that lead to the success of these applications.

[1] C. Fotakis et al., “Lasers in the preservation of cultural heritage”, Taylor & Francis (2006).



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