

Projects for Physics 10262

Physics Methods in Art and Archaeology

- Radiography and Raman spectroscopy in the analysis of Vermeer painting techniques

1. Mary Glennon,
2. Kathryn Mayka,
3. Shannon McNaught,
4. Nicholas Nowotarski



Literature:

1. Pigment Identification by Spectroscopic Means: Evidence Consistent with the Attribution of the Painting *Young Woman Seated at a Virginal* to Vermeer; Burgio, L.; Clark, R. J. H.; Sheldon, L.; Smith, G. D. *Anal. Chem.*; (Article); 2005; 77(5); 1261-1267

- The Archimedes Palimpsest, X-ray fluorescence as a tool for deciphering ancient manuscripts

1. Beatriz Almeida
2. Cassandra Burnham
3. Natalie Fang
4. Laura McGinn



Literature:

1. Reviel Netz and William Noel, *The Archimedes Codex*, Weidenfeld & Nicolson, 2007

- PIXE applications in Mesoamerican pottery analysis

1. Kelsey Falter
2. Stephanie House
3. Sarah Kimball
4. Anna Gabrielle O'Meara



Literature:

1. M. Uda, G. Demortier and I. Nakai, *X-rays for Archaeology*; Springer Netherlands, 2005
2. M. Sánchez del Río, P. Martinetto, A. Somogyi, C. Reyes-Valerio, E. Dooryhée, N. Peltier, L. Alianelli, B. Moignard, L. Pichon, T. Calligaro and J.-C. Dran; *Microanalysis study of archaeological mural samples containing Maya*

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blue pigment; Spectrochimica Acta Part B: Atomic Spectroscopy 59, (2004)
1619-1625

- Fake and forgery, scientific methods to unmask forgeries by Han van Meegeren.

1. Virginia Benz
2. David Bratton
3. Emily Cook
4. Barbara Johnson



Literature:

1. Jonathan Lopez; *The Man Who Made Vermeers: Unvarnishing the Legend of Master Forger Han van Meegeren*; Harcourt; 1 edition (2008)
2. Edward Dolnick; *The Forger's Spell: A True Story of Vermeer, Nazis, and the Greatest Art Hoax of the Twentieth Century*; Harper (June 24, 2008)

- The shroud of Turin, what are the uncertainties of ^{14}C dating

1. Kjerstin Johnson
2. Margaret Kowieski
3. Meggie O'Keefe
4. Morgan Pino



Literature:

1. Radiocarbon Dating of the Shroud of Turin; P. E. Damon, D. J. Donahue, B. H. Gore, A. L. Hatheway, A. J. T. Jull, T. W. Linick, P. J. Sercel, L. J. Toolin, C.R. Bronk, E. T. Hall, R. E. M. Hedges, R. Housley, I. A. Law, C. Perry, G. Bonani, S. Trumbore, W. Woelfli, J. C. Ambers, S. G. E. Bowman, M. N. Leese, M. S. Tite; *Nature*, Vol. 337, No. 6208 (1989) 611-615
2. H. E. Gove; *From Hiroshima to the Iceman*; Institute of Physics, Bristol & Philadelphia 1999; Chem/Physics (231 Nieuwland) General Collection: QC 454 .A25 G68 1999
3. Discrepancies in the radiocarbon dating area of the Turin shroud; M. S. Benford, J. G. Marino; *Chemistry Today*, 26 (2008), 4-12

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○ The Vinland map, real or fake?

1. Rebecca Amata
2. Shannon Chisholm
3. Anne Huntington
4. Julie Kirk



Literature:

1. The Vinland Map; Walter C. McCrone; Anal. Chem.; 1988; 60(10); 1009-1018
2. The Vinland map, revisited: new compositional evidence on its inks and parchment; T. A. Cahill, R. N. Schwab, B. H. Kusko, R. A. Eldred, G. Moller, D. Dutschke, D. L. Wick, A. S. Pooley; Anal. Chem.; 1987; 59(6); 829-833
3. Analysis of Pigmentary Materials on the Vinland Map and Tartar Relation by Raman Microprobe Spectroscopy; Brown, K. L.; Clark, R. J. H.; Anal. Chem.; (Article); 2002; 74(15); 3658-3661
4. Evidence That the Vinland Map Is Medieval; Olin, J. S. Anal. Chem.; (Small Correspondence); 2003; 75(23); 6745-6747.
5. The Vinland Map Ink Is NOT Medieval; Towe, K. M. Anal. Chem.; (Comment); 2004; 76(3); 863-865
6. The Vinland Map - Still a 20th Century Forgery Robin J. H. Clark Anal. Chem.; **2004**; 76(8) pp 2423 – 2423
7. On the Absence of Evidence That the Vinland Map Is Medieval; Henchman, M. Anal. Chem.; (Small Correspondence); 2004; 76(9); 2674-2674.

○ The origin of man, tracing the Neanderthal man

1. Alan Alaniz
2. Mary Cummins
3. Matthew Hentz
4. Eric Robinson



Literature:

1. Thermoluminescence dating of the late Neanderthal remains from Saint-Césaire; N. Mercier, H. Valladas, J-L. Joron, J-L. Reyss, F. Lévêque & B. Vandermeersch; Nature 351 (1991) 737 - 739
2. Mass-spectrometric U-series dates for Israeli Neanderthal/early modern hominid sites; F. McDermott, R. Grün, C. B. Stringer, C. J. Hawkesworth; Nature 363 (1993) 252 - 255

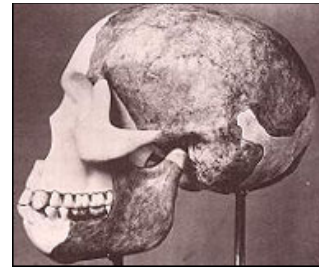
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3. Radiocarbon dating of interstratified Neanderthal and early modern human occupations at the Chatelperronian type-site; Brad Gravina, Paul Mellars, Christopher Bronk Ramsey; *Nature* 438 (2005) 51 – 56
4. Analysis of one million base pairs of Neanderthal DNA; Richard E. Green, Johannes Krause, Susan E. Ptak, Adrian W. Briggs, Michael T. Ronan, Jan F. Simons, Lei Du, Michael Egholm, Jonathan M. Rothberg, Maja Paunovic & Svante Pääbo; *Nature* 444 (2006) 330-336

○ Piltdown Man, proof of fake?

1. Laura Brown
2. Michael Gordon
3. Ellen Kozelka
4. Kerry Olinger

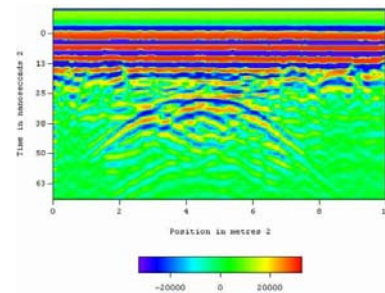


Literature:

1. The Exposure of the Piltdown Forgery; W. Le Gros Clark; *Nature* 175 (1955) 973 - 974
2. Radiocarbon Dating of the Piltdown Skull and Jaw; H. De Vries, K. P. Oackley; *Nature* 184 (1959) 224 - 226
3. Hominid whodunit; G. Ainsworth Harrison; *Nature* 348 (1990) 369 - 370
4. Box of bones 'clinches' identity of Piltdown palaeontology hoaxer; Henry Gee; *Nature* 381(1996) 261 - 262

○ GPR sub-surface search techniques in archaeology

1. Kimberley Gaughan
2. Joseph Palascak
3. Tatiana Spragins
4. Ding Zhang



Literature:

1. The use of ground-penetrating radar in archaeology. Conyers, L.B. ; In *Radiation in Art and Archaeology*. Eds, D.C. Creagh and D.A. Braadley, pp 1-14. (2000) Elsevier Science B.V., Amsterdam.
2. Radar Mapping Archaeology and Ancient Maya Land Use; Adams, R.E.W., W. E. Brown, Jr., and T. P. Culbert; *Science* 213 (1988)1457-1463
3. Conyers, L.B. and D. Goodman (1997) *Ground-Penetrating Radar: An introduction for Archaeologists*. Altamira Press, Walnut Creek, California

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- The Alvarez experiment, cosmic ray search for hidden chamber on the Chephren pyramid.

1. Jessica Bock
2. Emma Kessler
3. Francis Maritote
4. Christopher Masoud



Literature:

1. Search for Hidden Chambers in the Pyramids; L. W. Alvarez, et al. Science, 167 (1970) pp. 832-839

Additional literature on all of these topics offers Wikipedia and Google. An important journal with many publications on most of the listed topics is Nuclear Instruments and Methods B which can be found as electronic journal through the Notre Dame library

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Requirements for each group project:

1. 10 minute power-point presentation or overheads (last week of classes)!
2. 10 page (or more) report with first version due on October 17 - (last class before break)!

The report and presentation should contain:

- short introduction into subject
 - description of the goal of scientific investigation
 - scientific method and technique
 - results of scientific investigation
 - conclusion
 - bibliography of used material (including web addresses)
 - attached copies of most relevant material/literature used
3. Participation of each member of the group should be demonstrated!