

Gravitational lensing by charged black holes

S. Fernando and S. Roberts

Gen. Relativ. Gravit., 2002, **34**, 1221–1230

Deflection of light caused by a strong gravitational field is called gravitational lensing. Such phenomena associated with black holes are important in understanding the universe and Einstein's theory of relativity. This paper derives the expression for gravitational lensing for thin lenses, for a spherically symmetric, electrically charged black hole. Calculations demonstrate that when source, lens and observer are perfectly aligned, there can be up to three 'Einstein rings' for a charged black hole, whereas gravitational lensing by a neutral black hole always generates only one ring. The number of rings formed will depend on the mass, charge and the distances involved in the gravitational lensing by charged black holes. As a particular example, an exact calculation is presented for a charged super-massive black hole with mass 2.8×10^4 times the mass of the sun.

FAST CARS: Engineering a laser spectroscopic technique for rapid identification of bacterial sporesM. O. Scully *et al.**Proc. Natl. Acad. Sci. USA*, 2002, **99**, 10994–11001

Bio-aerosols are being currently detected using fluorescence spectroscopy and UV resonance Raman spectroscopy. A new technique of coherent anti-Stokes Raman spectroscopy (FAST CARS) described in this paper, is useful for identifying bacterial spores.

Microbial dehalorespiration with 1,1,1-trichloroethaneB. Sun *et al.**Science*, 2002, **298**, 1023–1025

Trichloroethane (TCA), a synthetic organic solvent, is a major pollutant contaminating the soil, groundwater and air. It is also cited as an ozone-depleting substance. A new TCA strain, isolated from a sediment that can dechlorinate TCA, is described as a short, rod-shaped,

motile anaerobe. Requirement of TCA as an electron acceptor suggests dechlorination to be a respiratory process. A phylogenetic analysis based on the 16S rDNA sequences point to *Dehalobacter restrictus* as its closest relative.

A proteomic view of the *Plasmodium falciparum* life cycleL. Florens *et al.**Nature*, 2002, **419**, 520–526

Better drugs and vaccines for malaria are likely to be invented after the completion of sequencing of the genome of the malaria parasite. This paper compares the stage-specific expression patterns of proteins in all four stages in the life cycle of the parasite. Sporozoites are isolated from the salivary glands, topozoites are purified from erythrocytes, merozoites from highly synchronized schizonts and the gametocytes from synchronized suspension cultures of asexual parasite. *Plasmodium falciparum* 3D7 clone, infecting the salivary glands of *Anopheles stephensi*, is used all through. Proteomes are analysed on the basis of whole-cell protein lysates of the four stages of the parasite. About half of the sporozoite proteins appear specifically unique to this stage. Several functionally related clusters co-express the proteins. This high-throughput proteomics approach is useful for developing potential drugs and vaccines against malaria.

Biomimetic synthesis and patterning of silver nanoparticlesR. R. Naik *et al.**Nature Mater.*, 2002, **1**, 169–172

This paper reports utilizing information contained within silver-binding peptides in the synthesis of silver nanoparticles. The peptides serve as a template for an orderly deposition of the inorganic material. The silver-binding peptide clones in phage library are used to obtain a reddish-coloured precipitate from a 0.1 mM silver nitrate aqueous solution incubated at room temperature for 24–48 h. Silver nanoparticles are identified and characterized with surface plasmon resonance, TEM, EDX and elec-

tron diffraction. Nanoparticles thus obtained are typically 60–150 nm in size.

A new single nucleotide polymorphism typing method and device by bioluminometric assay coupled with a photodiode arrayM. Kamahori *et al.**Meas. Sci. Technol.*, 2002, **13**, 1779–1785

At least three million single nucleotide polymorphisms (SNPs) are estimated to occur in the human genome. Mass spectrometric and laser-induced fluorescence detection methods are employed in SNP typing. A new, simpler and cheaper method is described in this paper that utilizes a bioluminometric assay coupled with a photodiode detection device. The system is good for detecting DNA in the concentration range of fmols. Pyrophosphates generated during extension of a PCR primer that can trigger bioluminescence in a luciferin–luciferase assay system is utilized in this method. The luminescence can then be detected in a coupled photodiode array to improve sensitivity. With a mutant mismatch that prevents extension of the primer, no luminescence is observed.

Use of enzymes deactivated by site-directed mutagenesis for the preparation of enantioselective membranes

A. Skolaut and J. Retey

Angew. Chem. Int. Ed. Engl., 2002, **41**, 2960–2962

Enantioselective membranes can preferentially transport only one stereoisomer of a biomolecule, obviating the need for resolution of racemic mixtures after chemical synthesis. To develop a simple and fast resolution method, this paper utilizes the strategy of making polymeric membranes incorporating a mutant enzyme that would bind substrate selectively but not catalyse reactions. Poly(dimethyl siloxane) polymer films are synthesized to immobilize mutants of histidine ammonia lyase and phenylalanine ammonia lyase that are used for stereoselective transport of L-histidine and L-phenylalanine respectively.