kidney anomalies; use of small quantities (~100 μl) in comparison with the conventional clinical analysis (~3ml); simultaneous evaluation of chlorine, sodium and potassium concentrations in urine samples, what is not always possible in the conventional analysis (Colorimetry and Flame Spectrometry); low activity (0.1 μCi), which reduces the radiation exposure during the handling process of the active material; due to the short time irradiation and short half-life, associated to the measured radioisotopes (^{38}Cl, ^{24}Na and ^{42}K), there is no residual activity in the urine sample after 48 hours. Regarding the disadvantages of using a nuclear method, two points must be considered: the need of technician experienced with radiological protection to perform the analysis and the necessity of a nuclear reactor; however, a small size prototype of neutron irradiator for clinical analysis is being developed, so that it can be used outside the reactor premises.

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[24/09/2000 - Painel]

Scintillation Light from Microstructure Detectors

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It has been pointed out in previous works [1],[2], that scintillation light emitted in microstructure based gaseous detectors (microstrips, microgaps, GEMs, etc.) can be used for non destructive testing of these detectors when they are associated to a CCD readout system. In the present work we report on a systematic study for several gas mixtures which includes measurements of the total light yields as a function of the electric field and of the spectrometric distribution of the light emitted, in the wavelength region between 250 and 930 μm.

The experimental results presented in this work were performed for three different electric field configurations: a GEM detector, a parallel plane chamber and a scintillation counter with a spherical anode.

A. Light measurements with the GEM detector

The experimental set-up is described in detail in [2]. A Quantix 1400 camera, manufactured by Photometrics Ltd, was used for the readout of the scintillation emitted from the GEM. The chamber was irradiated by an X-ray generator with a molybdenum tube and the gases, high purity research grade, are supplied to the chamber through stainless steel pipes without any additional purification.

B. Light measurements with the PPC

The parallel plate chamber consists of two parallel grids 0.35 *cm* apart. X-ray photons from an X-ray generator are used as excitation source. The tube is operated at about 10 *kV*, with a copper target. The light emitted is collected through a mylar window and detected by a UDT planar-diffused silicon photodiode (PIN-25DP). Long-pass colour glass filters are used to select the wavelength cut off. Current in the chamber was measured with a 610R Keithley electrometer and the photodiode was fed to an amplifier. The gases flow continuously, at atmospheric pressure, through calibrated flowmeters and the detector.

C. Light studies with the GSPC

The scintillation detector has a 3 *mm* diameter stainless steel spherical anode and is described in detail elsewhere [3]. The gas chamber is coupled, through Spectrosil A windows (without wavelength shifter), from one side to a 56 TUVP photomultiplier, having a S20 response, and from the other side to an Applied Photophysics monochromator, mod. 7300, equipped with a 1200 *g/mm* grating, blazed at 500 *nm*. The light analysed by the monochromator is detected by a second photomultiplier, an RCA C31034A, with a GaAs:CsO photocathode which covers the region between 185 and 930 *nm*. This photomultiplier is cooled to -20°C and is operated in the single photon counting mode.

The 56 TUVP photomultiplier was calibrated using the scintillation of a NaI (Tl) crystal when irradiated with ^{60}Co, ^{137}Cs and ^{22}Na gamma sources. As excitation sources, we used an X-ray photons from a collimated ^{55}Fe source (5.9 *keV*) and alpha particles from an ^{241}Am. Light and charge signals are fed into standard electronic units. All the xenon containing mixtures were kept in a closed gas circuit, at a pressure slightly above atmospheric

pressure, and were allowed to circulate by convection through a purifier containing calcium turnings heated at about 450°C [3]. Before filling, the system was evacuated with a diffusion pump. The other mixtures flow continuously, at atmospheric pressure, through calibrated flowmeters and the detector.

Among the gases and gas mixtures investigated, argon is the one which features the highest number of photons emitted per drifting electron in the region of sensitivity of our CCD. Argon is a cheap gas and it can be kept flowing through the chamber in order to minimize the influence of impurities on the light yield. However, the operation of the detector is limited to low charge gains. On the other hand, the electron diffusion coefficients are high in argon which makes it inadequate for imaging purposes. The addition of a small amount of CO_2 reduces considerably the electron diffusion coefficients but at the expense of a reduction of the total scintillation output. However, even with this reduction, a comfortable number of photons emitted per electron is obtained which makes the Ar/CO_2 mixtures suitable for optical read-out.

The addition of 2% of N_2 increases the scintillation yield but in a wavelength region where our CCD is not sensitive. Studies of other rare gas mixtures are in progress.

The processes leading to NIR light emissions are well understood and a good agreement is obtained, for argon, between experimental and theoretical data. Modelling studies of light emissions in a GEM detector are also in progress.

ACKNOWLEDGEMENTS

Acknowledgements are due to Dr. P. Ségur, from the Centre de Physique Atomique, Université Paul Sabatier, Toulouse, for providing us with the Boltzmann code and electron impact cross section data. This work was supported by contract CERN/P/FIS/1198/98 with the Portuguese FCT, and CNPq, Brazil.

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[24/09/2000 - Painel]

Análise da concentraçã de Urânio na dieta alimentar do paulistano usando a técnica de fissão.

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O objetivo deste trabalho é fazer um levantamento da dieta alimentar do paulistano e determinar a concentração de urânio presente nela, através do método da fissão. Recentemente foi desenvolvida no Laboratório do Acelerador Linear uma técnica para detectar traços de urânio em tecidos animais e vegetais. Esta técnica foi utilizada para medir a concentração de urânio em diversos órgãos de animais e, atualmente, estão sendo realizadas medidas em alimentos. Radionuclídeos ingeridos pelo homem, em especial os emissores de partículas α, podem ser responsáveis por uma dose localizada que, por sua vez, pode causar danos celulares significantes. Alguns estudos realizados na Inglaterra mostraram que a concentração de urânio em tecidos do corpo humano, em especial no esqueleto e em tecidos moles, é maior do que a de 20μg determinada pela Comissão Internacional de Proteção Radiológica (ICRP) para um Homem padrão de 70 Kilogramas. Os valores de ingestão diária de urânio na Inglaterra e no Brasil (estudo realizado na região urano-fosfática de Pernambuco), são respectivamente, de $\frac{1\mu gU}{dia}$ e de $\frac{0.82\mu gU}{dia}$ e estão dentro do limite de $\frac{1\mu gU}{dia}$ determinada pelo ICRP. A medida da concentração de urânio em alimentos pode ajudar a calcular a concentração de urânio absorvida pelos órgãos assim como a dose absorvida pelos mesmos. No presente trabalho foi feita uma pesquisa de campo para determinar a dieta alimentar média dos paulistanos. Foram escolhido alguns alimentos como cereais e derivados (arroz, farinha, feijão), carnes (bovina), sal, frutas (tomate), verduras (alface) e leite em pó. Foram preparadas, então soluções com diferentes concentrações, tendo sido utilizado o peso úmido dos alimentos. Para obter as soluções os alimentos foram incinerados, a aproximadamente 500 graus Celsius e sua cinzas