total background spectrum. The total background counts between the distinct samples appear rather different due to the sample parameter such as thickness and beam-sample-detector geometry are not constant over the exposed sample volume.
For the determination of high-Z elements, ^{109}Cd and ^{238}Pu sources were used. With the ^{238}Pu source, the overlap of X-ray lines of high-Z as Rb, Sr, Y and Zr and the elastic and inelastic scattering of Uranium L-X-rays is unavoidable. However, using the ^{109}Cd source, the compositional data for each of the parts of each individual fragment presents clearly high concentrations of Zr and Fe elements, while the Ti element is an order of magnitude lower. In addition, small amounts of Cu, Zn, Rb, Sr, and Y were detected in all the spectra indicating that their concentrations within the pottery fragments could be considerated at level of traces. Similarly, with the ^{238}Pu excitation source, all X-ray spectra confirmed the presence of Fe at high concentration and an order of magnitude stronger than Ti element, while relatively small amounts of K, Ca, Mn, Ni, Cu and Zn elements were also detected.
On the other hand, the 55Fe source was used for the determination of low atomic number elements. With this low-energy excitation source, elements as Al, Si, K and Ca were enhanced within the XRF spectra. The presence of these elements is an order of magnitude weaker than the amount of Ti, indicating that Al, Si, K and Ca elements are also present at low concentrations within the pottery fragments.
The strong elemental contribution within the samples came mainly out of the ceramic paste. In order to achieve a more accurate assessment of the pigment composition in all areas analyzed of each fragment, the elemental intensities data were normalized to their total background spectrum counts, respectively, and subtracted statically from their corresponding normalized paste composition.
The presence of a very high Iron concentration characterizes all samples, but some of them with red coloration in the plastic decoration show an increase in the intensity of the Iron peak compared to the paste. The red coloration could be attributed to Iron Oxide in the form of Hematite which, at the Paraná state, appears as a component of Laterite [1].
In the pottery plastic decoration, the dark coloration is used on the design motifs in the slip. The spectrum for the dark coloration of the slip shows an increase of the Manganese peak an order of magnitude with respect to the paste. The dark brown pigment is also observed on the sample so-called of contact at the spout external side. This pigment produces a significant increase in the Manganese content compared to the paste. Manganese is present only in the dark pigment in a substantial amount. The ceramic paste and other remaining pigments only show very low amounts of Manganese.
The white color of the pottery plastic decoration is mainly due to the presence of Potassium, which exhibits clearly an increase of its intensity in comparison with the paste.
Sixteen elements were identified by EDXRF within the pottery fragments from Santa Dalmacia farm archaeological site. A systematic presence of relatively high concentrations of Ti, Fe and Zr can characterize the ceramic pastes. Furthermore, the concentrations of Al, Si, K, Ca, Mn, Co, Ni, Cu and Zn could be considered at level of traces within the ceramic pastes. Small amounts of Rb, Sr, and Y are also present. The black pigment in the pottery plastic decoration is mainly due to the presence of Manganese. The red pigment is produced by the presence of Iron, while the white pigment is characterized by the presence of Potassium. For the eleven fragments, the graphic representation method points that the same materials were employed in the pottery production. In addition, the pigments in the plastic decoration were obtained from different inorganic materials.
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Use of the Scintillation Light for Quality Control of Microstructure for Gaseous Detectors

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Introduction

The microstructure based gaseous detectors developed during the last decade have shown very promising features. In particular, it is accepted today that they will be used for low-cost, high resolution intermediate tracking of

charged particles for the new high luminosity colliders. The detectors will cover a large area, (>100 m^2) and, due to technical constraints, will be assembled with small size elements (20 x 30 cm). Thus, a huge number of chambers has to be manufactured. Although, due to the recent improvements in manufacturing lines, the failure rate is expected to be very low (broken anodes 1-2%, shorts - 0.02-0.04%) [1,2], quality control remains an important issue as, to avoid time consuming assembly and replacement, the defective units should be rejected immediately after manufacture. Our group has been considering the possibility of performing non destructive testing of microstructure gaseous detectors (microstrips, microgaps, gems, etc.) using both the optical emission associated to the pure secondary scintillation, i.e., without charge multiplication, and/or scintillation accompanying the development of the electronic avalanches. The simpler defects in the microstrip plates are the anode breaks and shorts. The broken anodes can not be detected in a reliable way by optical microscope observation of the plates because an anode can be electrically broken without any visible absence of metal; the metal shorting paths can be very thin and difficult to notice. These defects can give rise to premature failure or to local gain variations in a plate. Furthermore, once the surface coatings that are used to avoid the electrical instabilities of the available resistive bulk substrates are added to the plate surface, they should be checked for homogenecity [4]. The breakdown of the microstrips under real operational conditions called for more resistant solutions, achieved through the deposition of partial coating on the metal edges. The alignment of these passivation strips and the homogeneity of the coating should also be checked. Most of the mentioned above defects have direct influence in the electric field configuration, thus both on the intensity and spectral distribution of the secondary scintillation. Under appropriate conditions, the localised light, for example, emitted along a microstrip, can be used to give information about its structure and defects. Because such a method does not require the read-out of individual electrodes it can be used to test the plates with minimal cost.

Results and Conclusions

An ILL6C microstrip plate, damaged due to previous harsh use, was operated in a chamber fitted with a window facing the plate surface and a low noise CCD read-out system [5] was mounted at the window. The optics was a standard 50 mm photographic lens. The measurements were carried out mainly with an argon-xenon mixture, but we got similar results with the inexpensive argon-nitrogen mixture. A ^{109}Cd X-ray source was used, and the scintillations were mainly due to fluorescence in the detector chamber, with a mean energy of about 8 keV. The results from a 200 s exposition, in which no corrections were performed on the data for non uniformity of the microstrip plate ilumination with X- rays, shown that the good condition anodes are clearly differentiated; the regular modulation seen on them is due to the shadowing effect of the drift mesh. The broken anodes fade out in the picture, and the breaking points of broken anodes are clearly brighter. This may be due to both the higher local fields and the increased number of primary electrons that are collected on those points. The anodes with missing adjacent neighbours are also brighter, due to the increased number of primary electrons drifting towards them. The acquired images were analysed using a commercial image software package [6]. The microstrip plate was carefully inspected with a microscope to confirm the information from the CCD. All the defects that were identified by visual inspection were found on the CCD image. As a further example of the capability of the technique that we want to introduce, a small part of the scintillation image of a GEM foil, obtained in similar conditions of microstrip showd that the individual holes are clearly visible and the light intensity modulations observed are due to both the illumination gradient and the detailed shape of the electrostatic field behind the GEM foil (the contour of the microgap plate used to check the gain of the GEM structure and of its ceramic carrier is clearly seen). Of course, secondary scintillation can be efficiently obtained with lower fields than those associated with the normal running of microstructure devices. So, it is in principle appropriate for a non-destructive test procedure. Also, the electrodes that under normal operating conditions of a detector are used as cathodes can, for test purposes, be used as anodes and the secondary scintillation around them can provide valuable information. The possibility of looking, in a simple way, for some characteristic spectral features can as well turn out to be useful. The spectral characteristics of the emission from some excited species might be a very sensitive probe of the local electric fields and their gradients, of course, much more sensitive than, for example, charge gains. We remark that the first CCDs picture of microstrip gaseous detectors were obtained a few years ago [7]. Useful discussions with Fabio Sauli for its use as a test method, as well as for providing the GEM foils, are acknowledged. The present work was supported by contracts CERN/P/FAE1099/96 and CERN/P/FAE1143/97.

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CORRELATION BETWEEN ABNORMAL URANIUM INCORPORATION AND RENAL FAILURE IN ANIMALS

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We report on an investigation of a long-lasting uranium ingestion from food, starting after weaning, and lasting until the animal maturity. The mode and interval of ingestion, in this case, simulate a common real-life scenario, which is valid for both animals and humans. Thus, the transfer coefficients of U to the organs of Wistar rats were determined as a function of the U concentration in the food. Groups of animals were fed with rat chow doped with uranyl nitrate at concentrations ranging from 0.5 to 100 *ppm*. The U content in the ashes of liver, kidneys, heart, brain, intestine, skin and testicles, was measured by the fission track counting technique, following neutron irradiation of the biological samples near the core of a research reactor; the results are shown in the figure.

We note that the transfer coefficient f for a given organ is defined by

$$f = \frac{C}{A}(d \cdot kg^{-1}), \tag{1}$$

where C $(mg - U\ /\ kg)$ is the U content per kg of organ mass, and A $(mg - U\ /\ day)$ is the amount of U daily consumed by the animal during its last, and prolonged, feeding period.
It has been argued recently if $C = C(A)$ is indeed a linear function, say $C = a \cdot A$, where a is a constant; in this case, $f = a$ $(constant)$. It has beeen demonstrated for vegetables that, in fact, $C = a \cdot A^b$, $0 < b < 1$ [1], leading to the hyperbolic function $f(A) = a \cdot A^{b-1}$. A visual inspection of the figure reveals that for $A < 1\ mg - U\ /\ day$ ($\sim 20\ ppm$ in the food) the transfer coefficient function $f = f(A)$ is hyperbolic, while only for intestine a hyperbola is verified up to $A = 5.2\ mg - U\ /\ day$ ($100\ ppm$ in the food). From least square fittings we got $b \approx 0.5$ for all organs; which is quite similar to vegetables.
Incidentally, in the animals from the groups fed with $A > 20\ ppm$ we detected ~ 50 red blood cells per $\mu\ell$ of urine, indicating thus the occurrence of lesions, which could lead to alteration of the glomerular filtration [2]. If, in this scenario, the U concentration in the blood increases, it may well be possible that C $(mg - U\ /\ kg)$ for each organ increases as well, except for the intestines where U is transferred mostly from the earlier uptake stage (at the GI tract).
Therefore, we are led to the conclusion that the deviation of $f = f(A)$ from the normal hyperbolic trend, for $A \geq 20\ ppm$, is a signature for renal malfunction. Note that for the intestines $f = f(A)$ mantains its hyperbolic shape in the whole range of A.