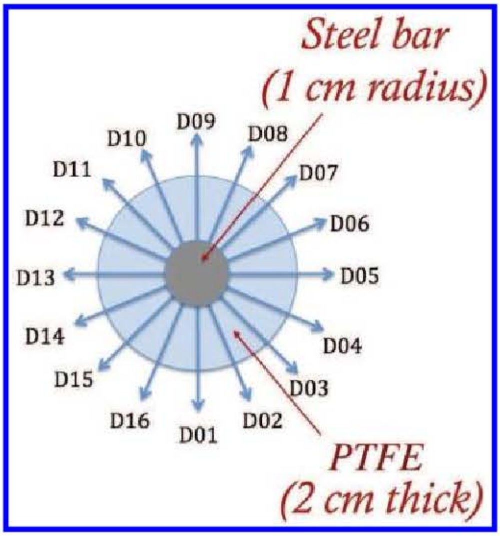

Fig. 1. Geometry of the experiment in Rome (see Ref. 9): a steel bar of 2 cm diameter, surrounded by 2 cm thick PTFE calorimeter, is irradiated by 20 kHz ultrasounds. Sixteen neutron detectors made of PADC polycarbonate are set all around the PTFE casing. The 16 (horizontal) directions normal to the detector surfaces (from D01 to D16) are reported in figure.

with frequency 20 kHz. The sample was held vertical and its lateral surface was surrounded by 2 cm thick PTFE of 188 g mass. Sixteen neutron detectors made of PADC polycarbonate and each one immersed in boric acid were set all around this PTFE calorimeter, in order to register the intensity distribution in a horizontal plane, normal to the axis of the sample (Fig. 1). The images obtained from these detectors were calibrated by comparison with those obtained after exposition to a neutron beam of known intensity from the channel of a nuclear reactor making use of 94% enriched Uranium.[14]

During 3 min of ultrasound irradiation, the steel bar temperature raised from 20°C to 92°C, while the PTFE melted (its melting temperature is 327°C) and was also locally carbonized. From these facts, the energy supplied to the steel bar was evaluated about 6 kJ, while the energy deposited in the PTFE calorimeter was more than 60 kJ.

After this evaluation, about 6 kJ was assumed as the energy supplied to the bar by the ultrasound generator, while the much larger energy transferred at higher temperature to the calorimeter was assumed as deposited from the emitted neutrons.

The distribution of energy transferred by the neutrons along a horizontal plane was obtained from the images of the 16 PADC detectors and is reported in Fig. 2: the resulting distribution is very anisotropic and asymmetric. The directions of maximum intensity, corresponding to 25 + 22 μSv (detector D10 and D02) and minimum intensity, corresponding to 0 + 0 μSv (detectors D06 and D14) are mutually perpendicular.