

Ph.D. Quals Question

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BLACKBODY RADIATION

To start, the figure below was shown to the students and attention drawn to its label: "A Cat in Infrared." They were asked, "Do you have any comment about the label on this figure?"

A Cat in Infrared



At this stage, most students began discussing blackbody radiation, which is good, but once again their attention was drawn to the label on the figure and asked if they could comment on it. The expected answer was "Oh, we cannot see infrared. The picture must have been prepared by using some process that converts the infrared radiation emitted by a cat to some visible representation." This usually led to a brief discussion of possible conversion processes and how the cat's ears and eyes in the above figure are hot and its nose cold. The use of night vision 'scopes was sometimes discussed at this stage (good). After this introductory start the students were asked specific questions about blackbody radiation. For example, "why is the term 'blackbody' used?" Importantly, students were expected to know that blackbody radiation depends only on the temperature of the source.

A schematic chip layout was now shown to the students and they were asked how blackbody radiation might be used in an electrical engineering context to diagnose chip problems. Most knew that heating of modern microprocessors is a major problem (good), but once again they were directed to the chip layout. Here