

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Indeterminacy and Image Improvement in Snake Infrared “Vision”¹ J. LEO VAN HEMMEN, Physik Department, TU Munich — Many snake species have infrared sense organs located on their head that can detect warm-blooded prey even in total darkness. The physical mechanism underlying this sense is that of a pinhole camera. The infrared image is projected onto a sensory ‘pit membrane’ of small size (of order mm²). To get a neuronal response the energy flux per unit time has to exceed a minimum threshold; furthermore, the source of this energy, the prey, is moving at a finite speed so the pinhole substituting for a lens has to be rather large (~ 1 mm). Accordingly the image is totally blurred. We have therefore done two things. First, we have determined the precise optical resolution that a snake can achieve for a given input. Second, in view of known, though still restricted, precision one may ask whether, and how, a snake can reconstruct the original image. The point is that the information needed to reconstruct the original temperature distribution in space is still available. We present an explicit mathematical model [1] allowing even high-quality reconstruction from the low-quality image on the pit membrane and indicate how a neuronal implementation might be realized. Ref: [1] A.B. Sichert, P. Friedel, and J.L. van Hemmen, TU Munich preprint (2005).

¹Supported by BCCN Munich & DFG (HE 3252/1-4)

J. Leo van Hemmen
Physik Department, TU Muenchen

Date submitted: 30 Nov 2005

Electronic form version 1.4