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(54) **METHOD AND APPARATUS FOR DETECTION OF A SPECKLE BASED PHYSICALLY UNCLONABLE FUNCTION**

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See application file for complete search history.

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(57)   **ABSTRACT**

An optical arrangement of at least a coherent light source (1), a strongly scattering object (5) (the PUF), and a pixe-lated photo-detector (6), wherein the pixels are comparable in size with the bright and dark patches of the speckle pattern produced by coherent radiation traversing the scattering object (5). Quantitatively, the pixel size should be roughly λ/NA, where λ is the wave-length, and (i) NA=a/z for free-space geometry, with a being the beam radius and z being the distance between the exit surface of the PUF (5) and the pixelated detector (6), or (ii) NA is the numerical aperture of a lens (7) in an imaging geometry. In a preferred embodiment of the invention, there are tentative requirements that the pixels should be at least smaller than $\eta_{max}\lambda$NA and preferably larger than $\eta_{max}\lambda$/NA, where (in an exemplary embodiment) η_{max}=5 and η_{min}=0.05, say. It will be understood by a person skilled in the art that the present invention is concerned with the optical arrangement of the PUF (5) and the photo-detector (6), rather than the photo -detector (6) per se.

16 Claims, 1 Drawing Sheet