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# **Design and Simulation of an all optical photonic crystal-based comparator**

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## **Abstract**

Optical comparators are essential elements required for creating all optical digital systems used in optical data processing. A new structure is proposed for designing a 1-bit optical comparators using nonlinear photonic crystal ring resonators. The nonlinear photonic crystal ring resonators are created by adding some additional dielectric rods around the core section of the resonant ring. These rods are made of doped glass which has relatively high Kerr coefficient. Four nonlinear resonant rings are used with optical waveguides to create the proposed comparator inside a 2D photonic crystal structure. The final structure can compare two 1-bit numbers. The maximum delay time and total footprint of the proposed structure is 6 ps and 1705  $\mu\text{m}^2$ , respectively.

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