From micro optics to information photonics

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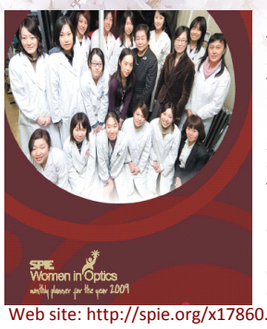


I have been engaged in basic theory, design, and fabrication in the field of micro-optics as well as applied fields in optoelectronics. I applied special features of diffractive optical elements that include ultrafast speed and parallel processing to new devices that I developed with my graduate students. One example is our design for the high dispersion VPH grism, installed in the Subaru telescope in Hawaii. We also built a face recognition system, called FARCO, using compact optical parallel correlation. An all-optical ultrafast image search engine is being developed for criminal identification and prevention of illegal downloading of motion pictures.

Web site: http://spie.org/x17860.xml

Why information photonics?

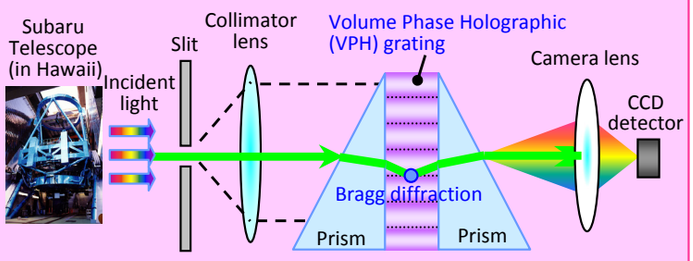
Speed.
-The possibilities of special purpose systems and massive parallelism give rise to high speed data processing.

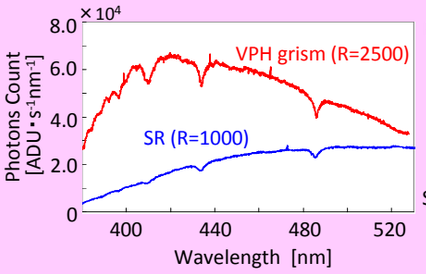
Direct image processing.
-Images are transferred using naturally thought of in terms of optical systems and a laser beam.

Massive parallelism and connectivity.
-The problems preventing the ultimate speeding up of conventional computers do not arise from the inadequate speed of the base elements.

Immunity to electromagnetic interference (EMI).
-The electrons circulating in a conventional computer are susceptible to electromagnetic interference.

Spectroscopic sensor for astronomical observation





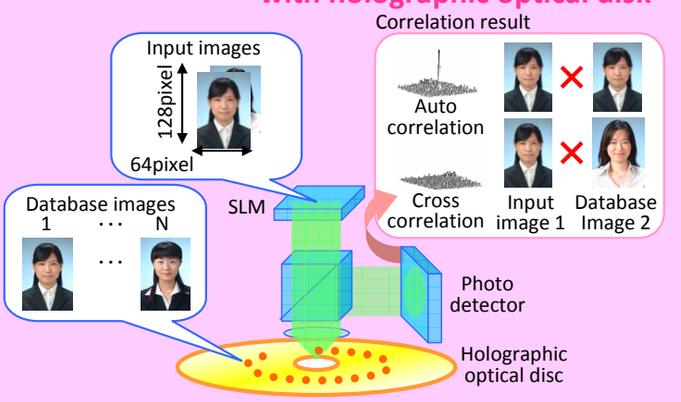
Performance of VPH grism

Diffraction efficiency: 84%
Wavefront accuracy error (rms): 0.4951

Standard star: G191B2B

Spectral observation of the VPH grism by Subaru Telescope 'FOCAS.'

High-speed optical correlator (FARCO 3.0) with holographic optical disk

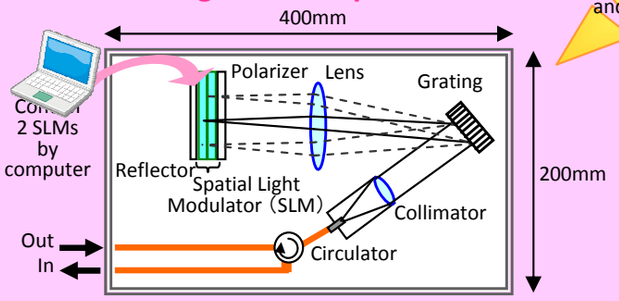


A huge amount of data can be stored in the holographic optical disc in the form of matched filter pattern. In the case of the correlation process an input facial image on the same positions is Fourier transformed by the same objective lens. As a result, the optical correlation process speeds up by simply rotatiry the disk at higher.

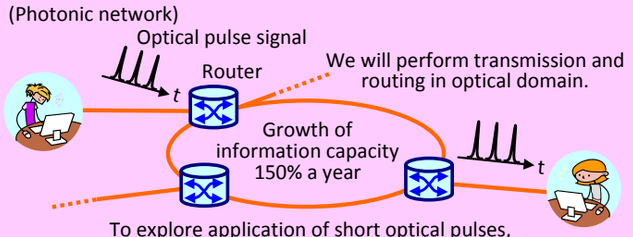
Optical total solution

Approaches by manufacturing and numerical analysis

Spectrum signal processing using DOEs for next generation photonic network



Configuration of variable bandwidth spectrum shaper (VBS)



To explore application of short optical pulses, techniques of arbitrary pulse generation is important.

VBS is control system of high-resolution and wideband spectrum for the future photonic networks.

The secret of the stone

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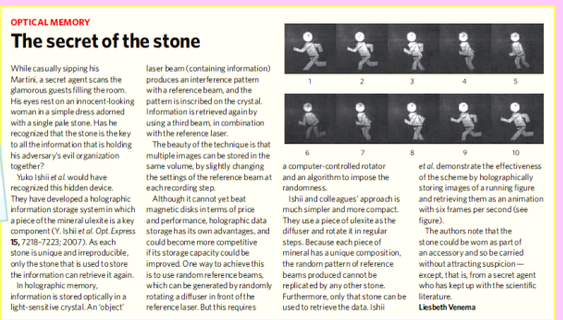

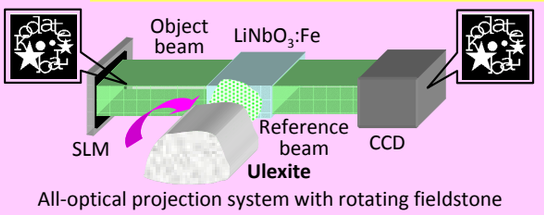

All-optical projection system with rotating fieldstone

Promoting equal participation of men and women in science and engineering

As **Program Officer** at Japan Science and Technology, coming up with activities aimed at promoting equal participation of men and women in science and technology, the Gender Equality Office was founded, and the Basic Plan for promoting gender equality in science and technology was agreed in April 2006.

Our activities include
- Encouraging female researchers to apply for JST's Basic Research Programs (e.g. CRESTO, Sakigake, etc.)
- Providing support for researchers who would like to return to research after having children / taking maternity leave (e.g. possible career breaks and extension of funding for projects)
- Consultation for girls at secondary school level in making their choice in subject specialis ation.