CLAIMS

1. An optical interference device comprising:

a phase shifter array for receiving a collimated beam of light, the phase shifter array comprising a plurality of blank cells, wherein:

the blank cells do not impose different phase shifts in the collimated beam of light incident on the blank cells; and

the blank cells are distributed throughout the phase shifter array, thereby forming a structure that divides the phase shifter array into a plurality of array sections, wherein each array section in the plurality of array sections is different from the blank cells, and comprises an array of cells for producing optical light channels from respective rays of the collimated beam of light, at least some of the optical light channels having different phase shifts as the collimated beam of light transmitted through the phase shifter array;

a focusing element having a focal distance and arranged to produce, from the optical light channels, a focused beam of light in its focal plane and an image downstream the phase shifter array for detection by an optical detector; and

an optical spatial filter arranged at the focal distance of the focusing element and arranged to filter the focused beam of light to produce a spatially distributed interference light pattern in zeroth order for detection by the optical detector.

2. The optical interference device according to claim 1, wherein the focusing element includes a lenslet array, with each lenslet arranged to receive one or more optical light channels, and the spatial filter includes an aperture array, with each aperture arranged at the focal distance of the respective lenslet of the lenslet array.

3. The optical interference device according to claim 1, wherein each cell in at least some of the cells of the array of cells includes a lamellar structure.

4. The optical interference device according to claim 3, wherein the lamellar structure includes alternately raised and recessed surfaces.

5. The optical interference device according to claim 4, wherein the lamellar structure includes an even number of the raised and recessed surfaces.

6. The optical interference device according to claim 4, wherein the lamellar structure includes an odd number of the raised and recessed surfaces.

7. The optical interference device according to claim 4, wherein the alternately raised and recessed surfaces form a concentric pattern.

8. The optical interference device according to claim 1, further comprising an optical collimator arranged to produce the collimated beam of light.

9. The optical interference device according to claim 8, further comprising an entrance aperture for directing an incident light towards the optical collimator.

10. The optical interference device according claim 1, wherein an interferogram is derived from the spatially distributed interference light pattern, and a spectrum is derived from the interferogram by using a system of linear equations.

11. The optical interference device according to claim 10, wherein the linear equations are solved using matrix inversion.

12. The optical interference device according to claim 1 in the form of a Fourier spectrometer.

13. The optical interference device according to claim 1 in the form of a Raman spectrometer.

14. The optical interference device according to claim 1, further comprising a further phase shifter array arranged adjacent to the phase shifter array, wherein the further phase shifter array is arranged to receive a reference beam of light.

15. A device comprising:
the optical interference device of claim 1, the optical interference device further including an optical housing for housing an optical collimator, the phase shifter array, the focusing element and the optical spatial filter, and a portable computing device having the optical detector in the form of a camera or focal plane array,
wherein the optical housing is adapted to be fitted to the camera or focal plane array, and wherein the camera or focal plane array is configured to detect the spatially distributed interference light pattern.

16. The optical interference device according to claim 1, wherein the device has a spectral resolution dependent on a maximum optical path difference generated between interfering beams.

17. The optical interference device according to claim 16, wherein the phase shifter array has a period not exceeding 10 times a maximum wavelength in the spectrum of the collimated beam of light.

18. The optical interference device according to claim 1, wherein the device has a throughput limited either by a collimation angle required for a given resolution, or by an angle of the first diffraction of the shortest wavelength emanating from the device, whichever is smaller.

19. The optical interference device according to claim 1, wherein the structure formed by the blank cells is a grid structure, a circular structure, or a structure with randomly distributed blank cells.

20. A method for producing a spatially distributed interference light pattern, comprising

receiving a collimated beam of light;

directing the collimated beam of light to a phase shifter array comprising a plurality of blank cells, wherein:

the blank cells do not impose different phase shifts in the collimated beam of light incident on the blank cells; and

the blank cells are distributed throughout the phase shifter array, thereby forming a structure that divides the phase shifter array into a plurality of array sections, wherein each array section in the plurality of array sections is different from the blank cells, and comprises an array of cells for producing optical light channels from respective rays of the collimated beam of light, at least some of the optical light channels having different phase shifts as the collimated beam of light transmitted through the phase shifter array;

providing a focusing element having a focal distance;

producing, by the focusing element, from the optical light channels, a focused beam of light in its focal plane and an image downstream for detection by an optical detector; providing an optical spatial filter at the focal distance of the focusing element and filtering the focused beam of light by the optical spatial filter to produce the spatially distributed interference light pattern in zeroth order for detection by the optical detector; and

measuring spatial intensity distribution of the collimated beam of light.