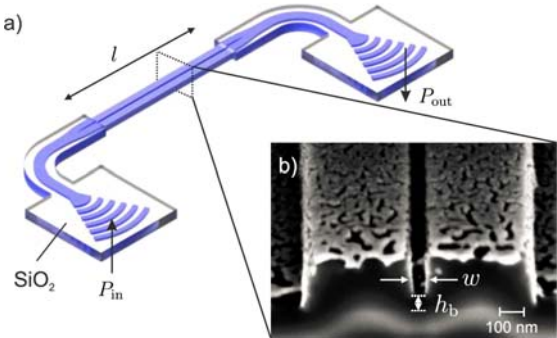


Interfacing nanophotonics circuits and atomic vapour cells 		Start date:
5AGS		
PhD: Ralf Ritter (Stuttgart)	PIs: Prof. Tilman Pfau (Stuttgart) Dr. Robert Löw (Stuttgart) Prof. Uriel Levy (Hebrew University) Liron Stern (Hebrew University)	
<p>Abstract: This project aims on the miniaturization and integration of vapour cells with chip scale photonic systems for the purpose of enhancing light-vapor interactions. Both applicants, in Jerusalem and in Stuttgart, have already started a few years ago to study such systems in various configurations. The goal of our joint project is to investigate and construct a new generation of chip-scale integrated systems. Specifically, we are aiming to construct a variety of systems, mostly relying on two-photon excitations schemes. To that end, two avenues will be explored: 1. Cascaded and two-photon absorption using the Rb 5S-5P-4D transitions in atomic cladding wave guides: Here, both Silicon wave guides supporting the wavelength of 1529nm (Stuttgart), and SiN waveguide supporting the wavelengths of 1529nm and 780nm (Jerusalem) will be used. After our work on Ring resonators we also studied in much detail the interaction between slot waveguides and thermal Rubidium atoms. To understand the details of the underlying physics we performed heavy numerical simulations and also included the theory group of Stefan Scheel (Rostock) to calculate the accurate Casimir-Polder potentials.</p>		
		<p>Figure: In a) a schematic of our slot-waveguides is shown and in b) we took high resolution electron microscopy picture to obtain the actual shape of the waveguides. This is actually important information to determine the details of the optical modes and the intensity distribution interacting with the atoms. The white patches on the waveguide is sputtered gold to prevent charging during imaging.</p>
<p>Recent results:</p> <ul style="list-style-type: none"> • Realization of slot-waveguides coupled to Rubidium atoms • Setup of a 1529nm laser and first spectroscopy results • Presentation of waveguide work at several conferences, workshops and colloquia (Shanghai, Belgrade, London, Leiden, Durham, 	<p>Publications:</p> <ul style="list-style-type: none"> • R. Ritter, N. Gruhler, W. H. P. Pernice, H. Kübler, T. Pfau and R. Löw, "Coupling thermal atomic vapor to an integrated ring resonator", New Journal of Physics 18, 103031 (2016) • R. Ritter, Nico Gruhler, Helge Dobbertin, Stefan Scheel, Wolfram Pernice, Harald Kübler, Tilman Pfau, and Robert Löw, "Coupling an atomic vapor to slot waveguides", in preparation 	
<p>Further Collaborators: Wolfram Pernice (Uni Münster), Helge Dobbertin & Stefan Scheel (Uni Rostock)</p>		