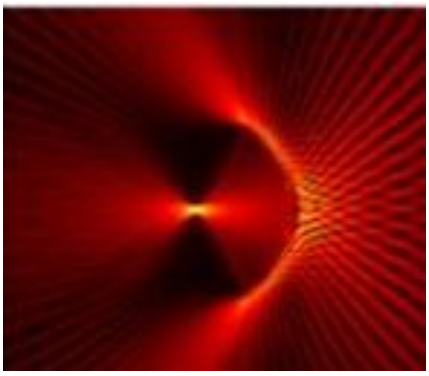
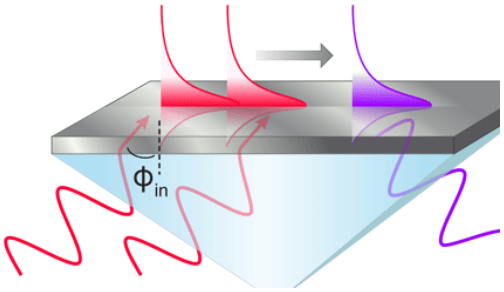
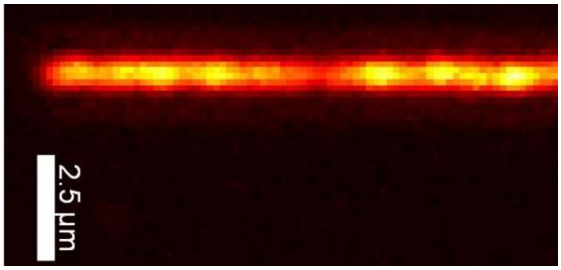
Research (What is it about?)	**Plasmon levitation**
UNN authors	*Maslov A.*
We find (The result)	It is predicted that the optical force induced by a ***surface plasmon*** can form a stable equilibrium position for a resonant particle at a finite distance from the surface. The levitated particle can be efficiently ***propelled*** along the surface without touching it.
Abstract	The possibility of a stable equilibrium (levitation) of small particle in optical beam (in the maximum of electromagnetic field) due to the gradient forces is known for a long time. Since in closed (metal or hollow dielectric) waveguides the intrinsic maximum of field is formed, an optical levitation is possible there as well. At the first glance, for the open waveguide systems (metal surface for example) levitation is impossible because the maximum of guided field here is in the surface and the particle will be carried to it. We show nevertheless that in the case of plasmon excitation and its propagation along the metal surface levitation is possible in a certain band of parameters (frequencies, particle sizes, electron concentration in metal etc.). The holding forces are substantially resonant ones. The levitation effect connects with the ***scattering of nonzero impulse plasmon*** at the particle of wavelength band size. It was shown that the particle can be reliably trapped at some distance above the surface and efficiently propelled along the surface. The trapping takes place at frequencies near the particle resonance. The particle resonance can be away from the plasmon resonance and, therefore, the plasmon absorption can be rather weak. The levitation without propulsion can be realized by using two counter-propagating waves.

Representative articles 2017-2018, quartiles	1. *Maslov A.V.* Levitation and propulsion of a Mie-resonance particle by a surface plasmon. Optics Letts. **42**(17), 3327-3330 (2017).	Q1
	Q-index (Qi) for the result	**4**
	high blue	

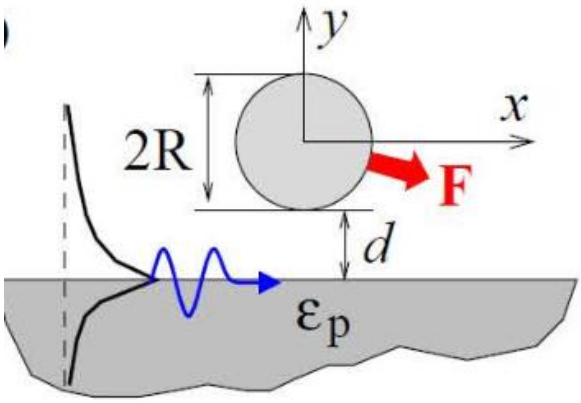
In collaboration	–





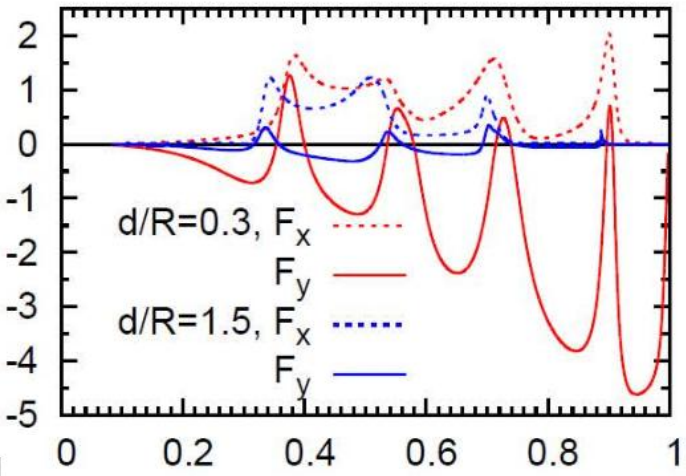


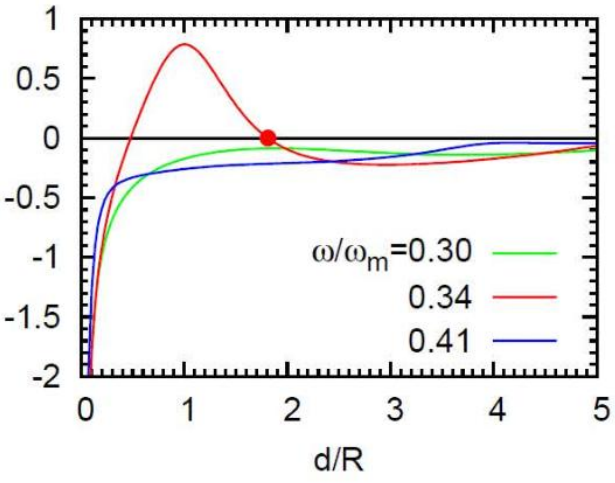
Plasmons on metal surface.



The geometry of levitation problem.

Resonant optical forces along *x* and *y* axis depending on the frequency.





The holding force (F_y) depending on the *d/R* ratio for three values of frequency.
One can see that the ***stable equilibrium*** (marked by red dot) is possible only for one of them.