Cortical network is composed of excitatory and inhibitory neurons which are highly interconnected via synaptic contacts. The information flow between neurons is called synaptic transmission. This process is dynamically modulated via several modulatory systems. Also, synaptic transmission undergoes long-term changes upon animal's experience. This process is called synaptic plasticity and is the essential feature of our brain allowing us for learning and recovery after injuries. The most interesting feature of inhibitory neurons is the fact that they are very diverse, thus, determining the specific roles of different subpopulations of inhibitory neurons is fundamental for understanding cortical function. Inhibitory neurons called also as interneurons release GABA (gamma-Aminobutyric acid) which is the main inhibitory neurotransmitter in the mammalian brain. GABA acts on several types of its receptors inhibiting the activity of target neurons. Here we will study how GABAb receptor, which are responsible for slow inhibition, modulate synaptic transmission, neuronal excitability and synaptic plasticity in cortical network of a mouse brain. Our project will provide basic but fundamental knowledge about neuronal functions. In the future, our data will contribute to the progress of biomedical sciences that study brain pathologies, since the disturbance in the balance between excitation and inhibition has been recognized in many pathological stages, such as e.g. epilepsy, depression, schizophrenia, autism spectrum disorder, and Alzheimer and Parkinson diseases.