The classical extension theory of symmetric operators provides an explicit
criterium for an operator to posses a self-adjoint extension and describes
all such extensions. The role of this theory in modern quantum mechanics
cannot be overestimated. In our talk we are going to discuss a generalization
of this approach when the operator is acting in a Gelfand triplet of Hilbert
spaces
\[ G \subset H \subset G^+. \]
Assume that the operator \( B \) is symmetric in the Hilbert space \( G \), but es-
tentially self-adjoint in \( H \). Such situation occurs for example when consid-
ering singular differential operators or during the studies of resonances. We
construct a family of generalized (outside the original Hilbert space \( G \) self-
adjoint extensions of \( B \) but still inside the triplet. All such extensions can
be described by certain boundary conditions and a natural counterpart of
Krein’s resolvent formula is obtained. The spectral properties of such ex-
tensions are encoded in a certain generalized Nevanlinna function and are
discussed as well.