Let $L_w$ be a divergence form degenerate elliptic operator with degeneracy controlled by a Muckenhoupt $A_2$ weight $w$. C. Rios and D. Cruz-Uribe solved the Kato problem for $L_w$ obtaining that these operators satisfy the $L^2(w)$-estimates
\[ \| L_w^{1/2} f \|_{L^2(w)} \approx \| \nabla f \|_{L^2(w)}. \]
In this talk we will present some recent results showing that, for some restricted class of $A_2$ weights, we can obtain the unweighted Kato problem for degenerate elliptic operators, that is,
\[ \| L_w^{1/2} f \|_{L^2(dx)} \approx \| \nabla f \|_{L^2(dx)}. \]
These estimates are proved by developing the $L^p(w)$-theory for the operators associated with $L_w$ and by establishing “weighted” estimates (with respect to the underlying measure $dw(x) = w(x) \, dx$) for these operators. (Received July 28, 2014)