1086-49-32 **N.U AHMED*** (ahmed@site.uottawa.ca), Professor N.U.Ahmed, EECS, University of Ottawa, Ottawa, Ontario K1N6N5, Canada, and **Charalambos Charalambos** (chadcha@ucy.ac.cy), Professor C.D. Charalambos, Nicosia, Cyprus. *Minimum Principle for Stochastic Differential Equations Subject to Continuous Diffusion and Lévy Process and Governed by Relaxed Controls.*

In this paper we consider non convex control problems of stochastic differential equations driven by relaxed controls. Let $(\Omega, \mathcal{F}, \mathcal{F}_t, P)$ denote a complete filtered probability space with $\mathcal{F}_t, t \geq 0$, denoting a complete filtration contained in $\mathcal{F}$ satisfying right continuity and possessing left limits. Let $W \equiv \{W(t), t \geq 0\}$ denote an R^m valued Brownian motion and $\{q(dt \times dv)\}$ a random counting measure all adapted to the sigma algebra $\mathcal{F}_t$. The system model is given by

$$dx = b(t,x,u_t)dt + \sigma(t,x,u_t)dW + \int_{R^n \setminus \{0\}} C(t,x,v,u_t)q(dt \times dv), x(0) = x_0 \tag{1}$$

where for any function f we write

$$f(t,x,u_t) \equiv \int_U f(t,x,\xi)u_t(d\xi)$$

for any $\mathcal{M}_1(U)$ (probability measure) valued random process $u_t, t \geq 0$. The cost functional is given by

$$J(u) = \mathcal{E}\left\{ \int_0^T \ell(t,x,u_t)dt + \Phi(x(T)) \right\}. \tag{2}$$

The objective is to find a relaxed (measure valued) control that minimizes the functional J. We present existence of optimal controls and then develop necessary conditions of optimality. We cover both continuous diffusion and Jump processes. (Received June 04, 2012)