

Contents

Foreword	4
A Curriculum Vitæ and presentation of the scientific activities	5
B Results in Dark Matter Indirect Detection	25
1 Introduction to Dark Matter and Indirect Detection	27
2 Dark Matter distribution	31
2.1 DM density distribution	31
2.1.1 Milky Way parameters	33
2.2 Dark Matter velocity distribution	34
2.2.1 DM velocity with respect to the Sun	35
2.2.2 DM velocity with respect to the Earth	35
3 Energy spectra of cosmic rays from DM, at production	37
3.1 Introduction and method	37
3.1.1 Inclusion of ElectroWeak radiation	38
3.1.2 Comments on some specific channels	38
3.2 Results	39
3.3 Neutrinos from the center of the Sun	42
4 Computation of the propagation and thus the observable CR fluxes at Earth	46
4.1 Propagation of electrons and positrons	46
4.1.1 An improved energy loss function for $e^\pm$ in the Galaxy	48
4.1.2 Electrons or positrons: result	54
4.2 Propagation of antiprotons	56
4.2.1 Solar modulation in a force field approximation	57
4.3 Propagation of antideuterium (and heavier antinuclei)	58
4.4 Prompt gamma rays	59
4.5 Secondary photons	62
4.5.1 Inverse Compton gamma rays	62
4.5.2 Bremsstrahlung gamma rays	64
4.5.3 Synchrotron radiation	65
4.6 Propagation of neutrinos from the center of the Sun	66

<i>CONTENTS</i>	3
4.6.1 Formalism	66
4.6.2 Results	70
5 Status of the searches	73
5.1 The positron and electron excesses	73
5.2 The 130 GeV line	75
5.3 The GeV Galactic Center excess	76
5.4 The 3.5 KeV X-ray line	78
5.5 Conclusions	79
Epilog	80