An estimation of percentage of pion, kaon and other particles produced in Nuclear Emulsion---- A Simulated approach.

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Multiparticle production in both high-energy nuclear and particle collisions is still a mystery, as far as the understanding of the dynamics of the production of secondary particles, especially of the soft varieties, is concerned. Of the various types of particles produced, mesons, especially the π-mesons, constitute, in practical terms, the near totality of the produced particles. Along with pions, in high-energy interactions kaons, hyperons and other mesons are also produced. In on line experiments such as RHIC or LHC all the mesons can be detected. However, in emulsion experiments, there is no identification of the produced particles making a study of particle ratio fluctuations or net charge fluctuations impossible. In emulsion experiments, therefore, it is not possible to distinguish between pions and and other mesons. There is one way to look at the compositions of the particles produced in high-energy nucleus-nucleus interactions in nuclear emulsion track detector. Comparisons with Monte Carlo expectations will be useful to understand the effect of contamination of other mesons in pion production. In this paper, we have applied the UrQMD model, the AMPT model and the DPMJET III model to study the percentage of pions and other mesons that is expected to be produced in emulsion experiments. In our study we have generated events for $^{32}S - AgBr$ interactions at 4.5AGeV/c, $^{28}Si - AgBr$ interactions at 4.5 AGeV/c, $^{16}O - AgBr$ interactions at 4.5 AGeV/c and $^{22}Ne - AgBr$ interactions at 4.1 AGeV/c by applying UrQMD [1], AMPT [2] and DPMJET III [3] model. The calculated percentage of different particles produced at (4.1-4.5) AGeV/c has been given in table 1.

Table 1

Particle Produced	**Model**	**Interactions**			
		^{32}S - $AgBr$ 4.5 AGeV/c	^{28}Si - $AgBr$ 4.5 AGeV/c	^{16}O - $AgBr$ 4.5 AGeV/c	^{22}Ne - $AgBr$ 4.1 AGeV/c
% of π - mesons produced	**UrQMD**	(91.44±.13)%	(91.78±.11)%	(92.40±.10)%	(91.19±.08)%
	AMPT	(96.76±.11%)	(96.77±.16)%	(97.05±.14)%	(98.03±.16)%
	DPMJET III	(96.43±.11%)	(96.30±.16)%	(97.27±.14)%	(96.94±.16)%
% of Kaons produced	**UrQMD**	(4.01±.07)%	(3.80±.06)%	(3.43±.05)%	(4.86±.04)%
	AMPT	(2.16±.03)%	(2.14±.04)%	(2.04±.01)%	(1.46±.01)%
	DPMJET III	(2.82±.03)%	(2.90±.04)%	(2.21±.01)%	(2.53±.01)%
% of Λ - hyperons produced	**UrQMD**	(1.49±.04)%	(1.44±.03)%	(1.45±.02)%	(1.36±.03)%
	AMPT	(0.96±.01)%	(.90±.02)%	(0.79±.03)%	(0.40±.02)%
	DPMJET III	(0.39±.01)%	(.39±.02)%	(0.27±.03)%	(0.28±.02)%
% of ϕ - mesons produced	**UrQMD**	(1.96±.04)%	(1.85±.03)%	(1.58±.01)%	(1.59±.01)%
	AMPT	0.00%	0.00%	0.00%	0.00%
	DPMJET III	0.00%	0.00%	0.00%	0.00%
% of η mesons produced	**UrQMD**	(1.08±.02)%	(1.11±.01)%	(1.11±.01)%	(0.99±.01)%
	AMPT	0.00%	0.00%	0.00%	0.00%
	DPMJET III	0.00%	0.00%	0.00%	0.00%
% of Σ - hyperons produced	**UrQMD**	0.00%	0.00%	0.00%	0.00%
	AMPT	0.00%	0.00%	0.00%	0.00%
	DPMJET III	(0.36±.01)%	(.39±.02)%	(0.24±.03)%	(0.24±.02)%

Table 1 represents the percentage yield of different particles at (4.1-4.5) AGeV/c using three different event generators.

References

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