On the dynamical interplay between awareness and epidemic spreading in multiplex networks

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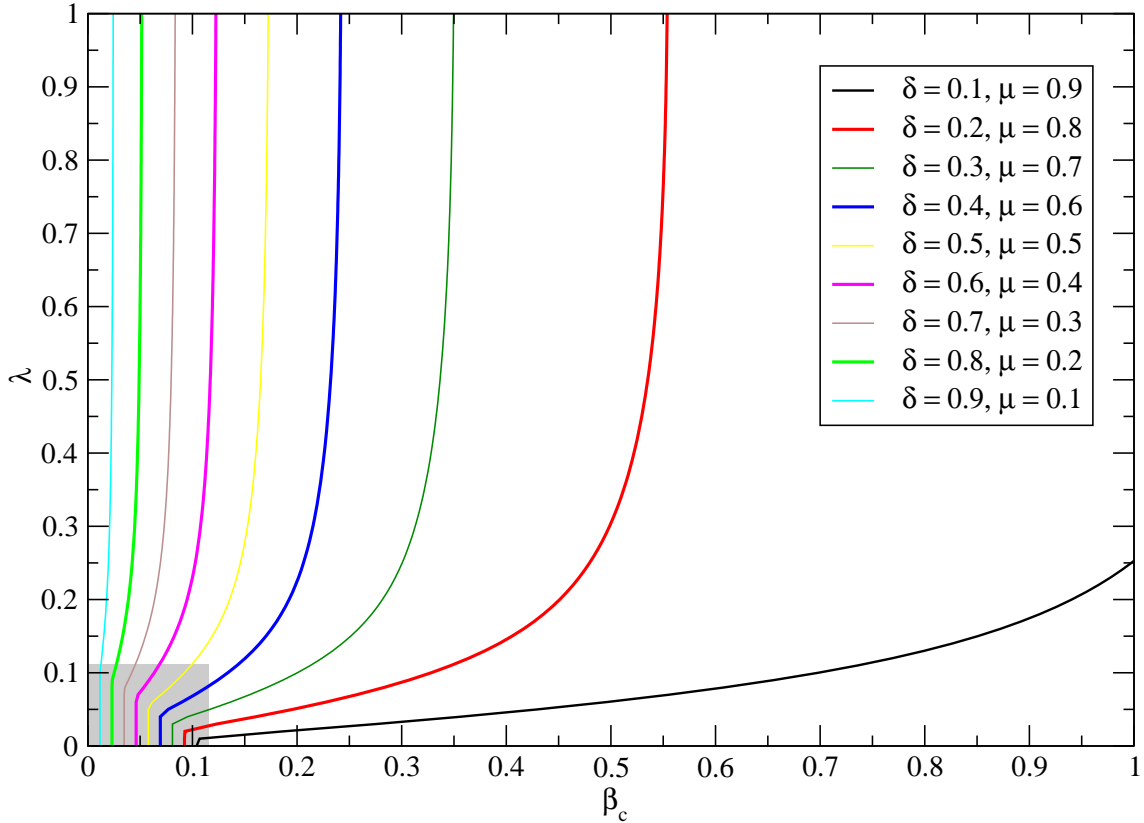Figure 1: (color online) Dependence of the onset of the epidemics β_c as a function of λ computed using Eq.(5) of main text, for different values of the recovery δ and μ, for a multiplex formed by: physical layer, a scale-free network of 1000 nodes with degree distribution $P(k) \sim k^{-2.5}$, and virtual layer, same scale-free network with 400 extra (non-overlapping) random links. The shaded rectangle corresponds to the area where the meta-critical points may be, which are bounded by the topological characteristics of the multiplex $1/\Lambda_{\max}(A)$ and $1/\Lambda_{\max}(B)$.
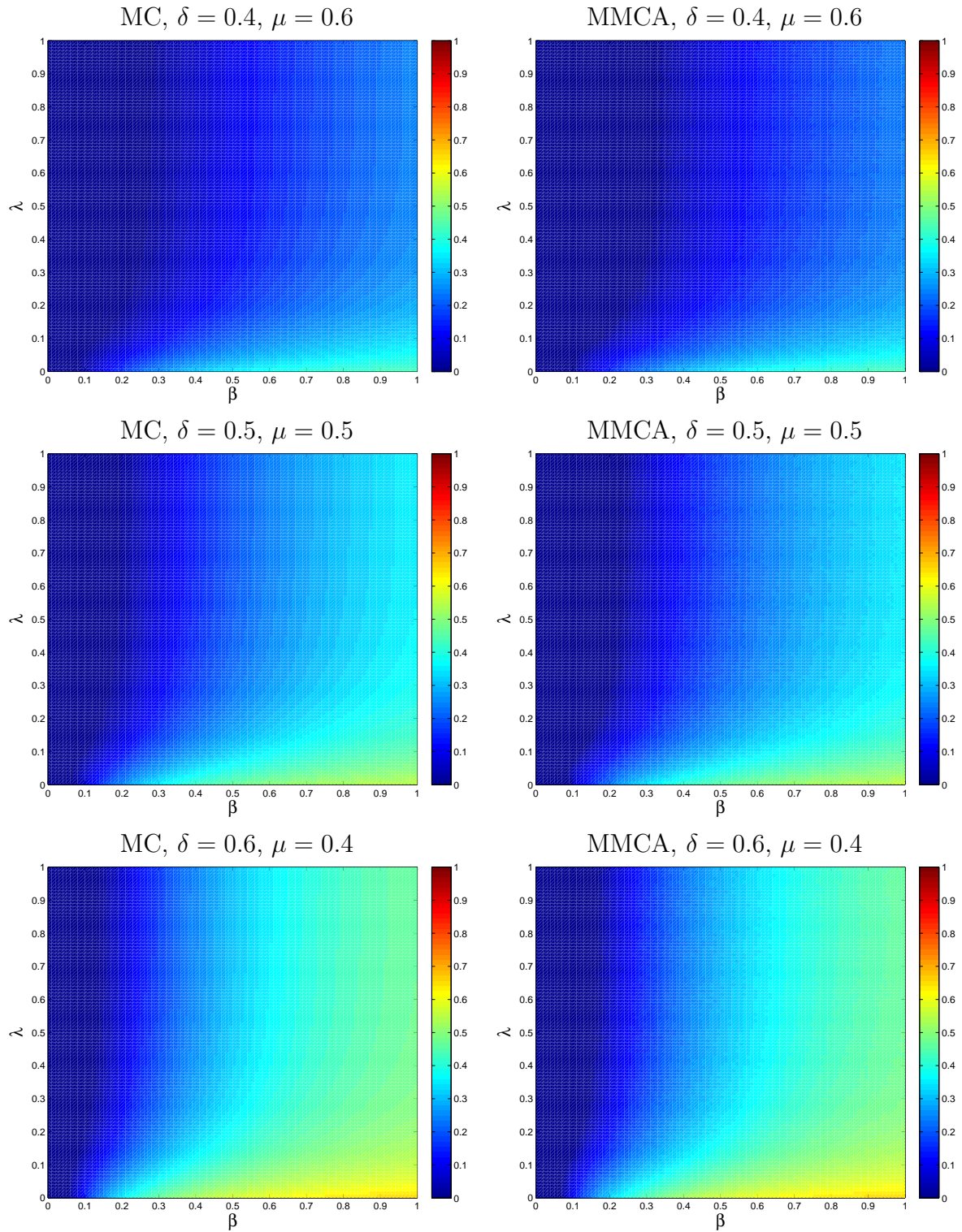
Figure 2: (color online) Comparison between Monte Carlo and MMCA for the fraction ρ^I of infected individuals in the stationary state. Multiplex formed by: virtual layer, Erdös-Rényi network of 1000 nodes with $\langle k \rangle = 8$, and physical layer, a scale-free network of 1000 nodes with degree distribution $P(k) \sim k^{-2.5}$. Full 100×100 $\lambda - \beta$ phase diagram. MC values are averages over 50 simulations, and initial fraction of infected nodes is 20%. The relative errors between MC and MMCA are: 0.9%, 1.0%, and 1.2%, respectively.
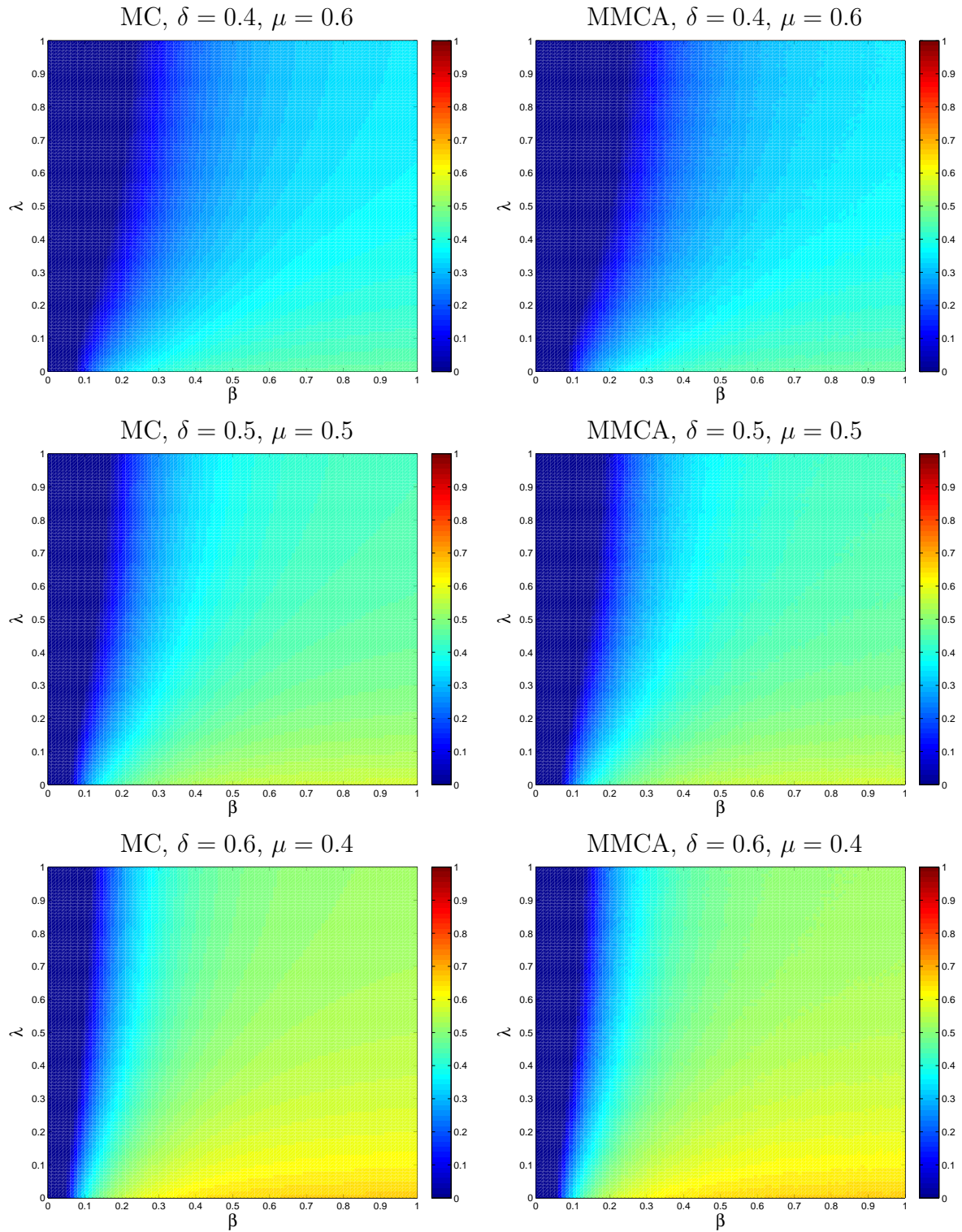
Figure 3: (color online) Comparison between Monte Carlo and MMCA for the fraction ρ^I of infected individuals in the stationary state. Multiplex formed by: virtual layer, a scale-free network of 1000 nodes with degree distribution $P(k) \sim k^{-2.5}$, and physical layer, Erdös-Rényi network of 1000 nodes with $\langle k \rangle = 8$. Full 100×100 $\lambda - \beta$ phase diagram. MC values are averages over 50 simulations, and initial fraction of infected nodes is 20%. The relative errors between MC and MMCA are: 0.4%, 0.4%, and 0.4%, respectively.
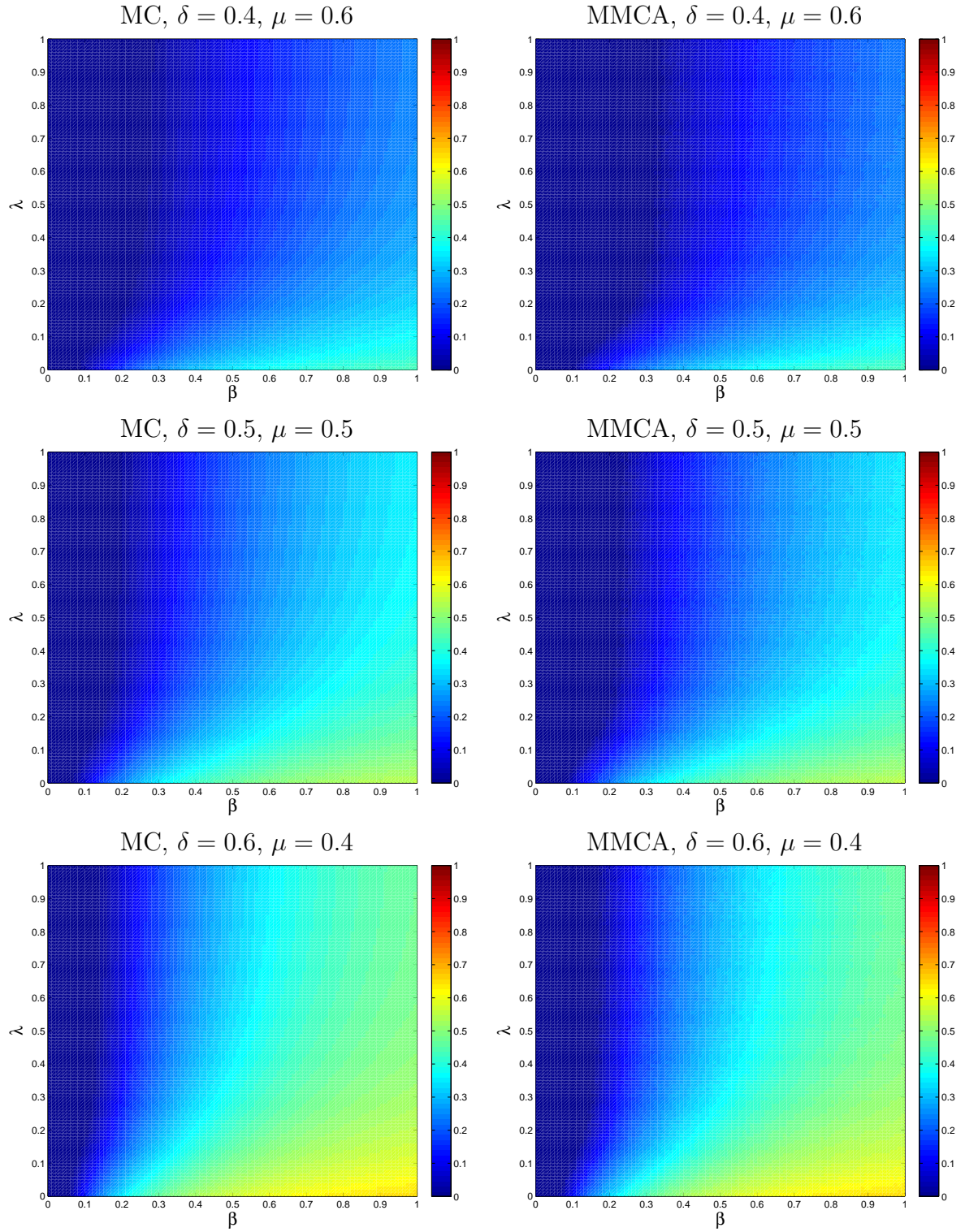
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Figure 4: (color online) Comparison between Monte Carlo and MMCA for the fraction ρ^I of infected individuals in the stationary state. Multiplex formed by: physical layer, a scale-free network of 1000 nodes with degree distribution $P(k) \sim k^{-2.5}$, and virtual layer, same scale-free network with 400 extra (non-overlapping) random links. Full 100×100 $\lambda - \beta$ phase diagram. MC values are averages over 50 simulations, and initial fraction of infected nodes is 20%. The relative errors between MC and MMCA are: 1.2%, 1.5%, and 1.6%, respectively.
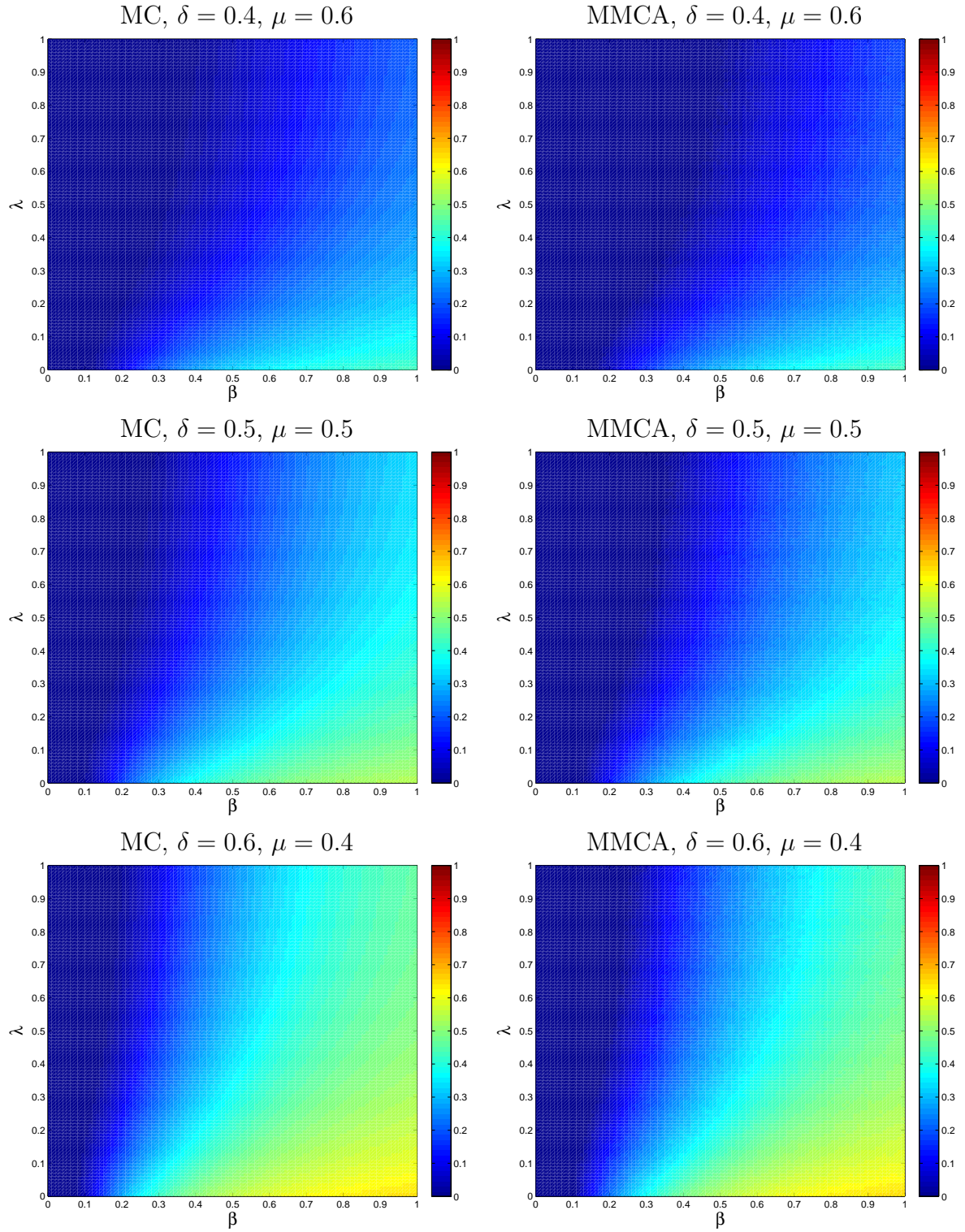
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Figure 5: (color online) Comparison between Monte Carlo and MMCA for the fraction ρ^I of infected individuals in the stationary state. Multiplex formed by: virtual layer, a scale-free network of 1000 nodes with degree distribution $P(k) \sim k^{-2.5}$, and physical layer, a scale-free network of 1000 nodes with degree distribution $P(k) \sim k^{-3.0}$. Full 100×100 $\lambda - \beta$ phase diagram. MC values are averages over 50 simulations, and initial fraction of infected nodes is 20%. The relative errors between MC and MMCA are: 1.9%, 2.3%, and 2.5%, respectively.