Kerr Miller

YTF 2025 Gong Talk

University of Glasgow

Kerr Miller

Final-year PhD Student

😱 😵‍💫

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HPQCD

Kerr Miller

High-**P**recision **Q**uantum **C**hromo**D**ynamics
(lattice collaboration)

Judd Harrison Christine Davies Antonio Smecca

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"B^*, D^*, B_s^* and D_s^* Vector and Tensor Decay Constants and Hyperfine Splittings with Fully Relativistic Lattice QCD" (working title)

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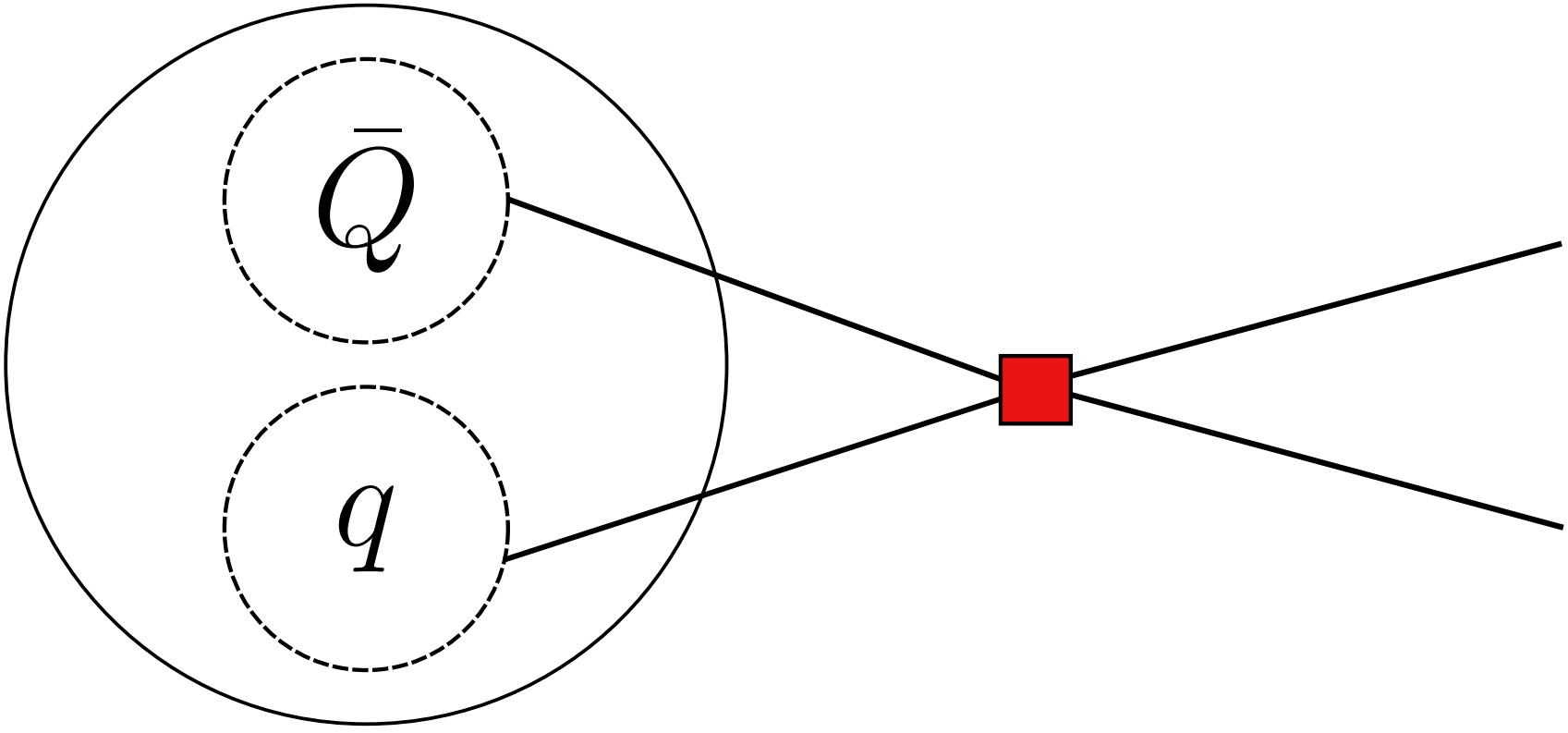
"B^*, D^*, B_s^* and D_s^* Vector and Tensor Decay Constants and Hyperfine Splittings with Fully Relativistic Lattice QCD" (working title)

To appear on arXiv soon — keep an eye out!

Physics Picture



$\bar{Q} = \bar{b}, \bar{c}$ and $q = u, d, s$

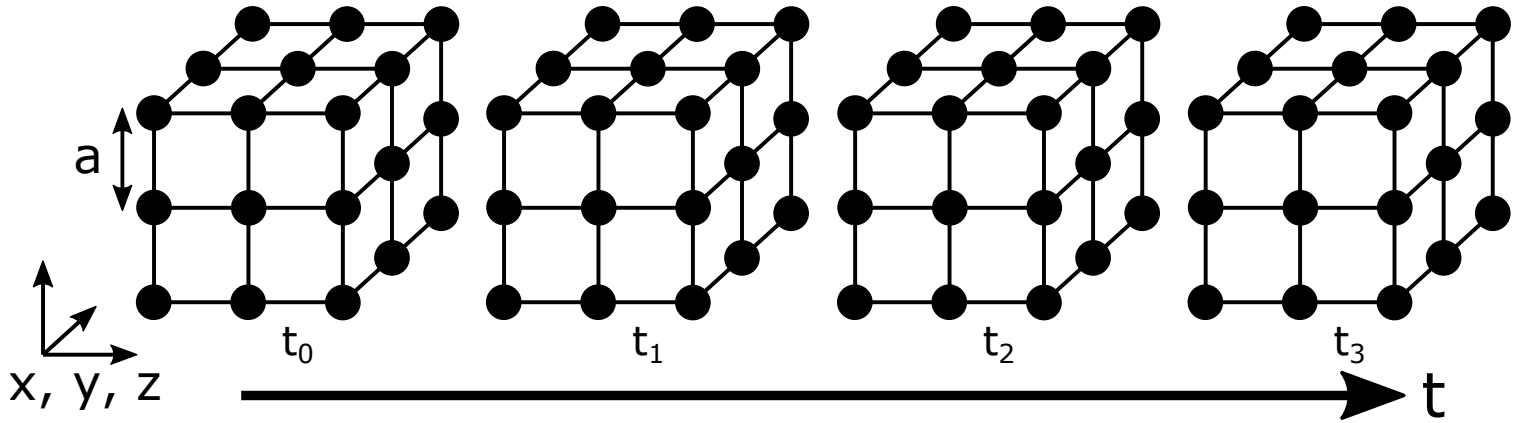
Currents and Decay Constants

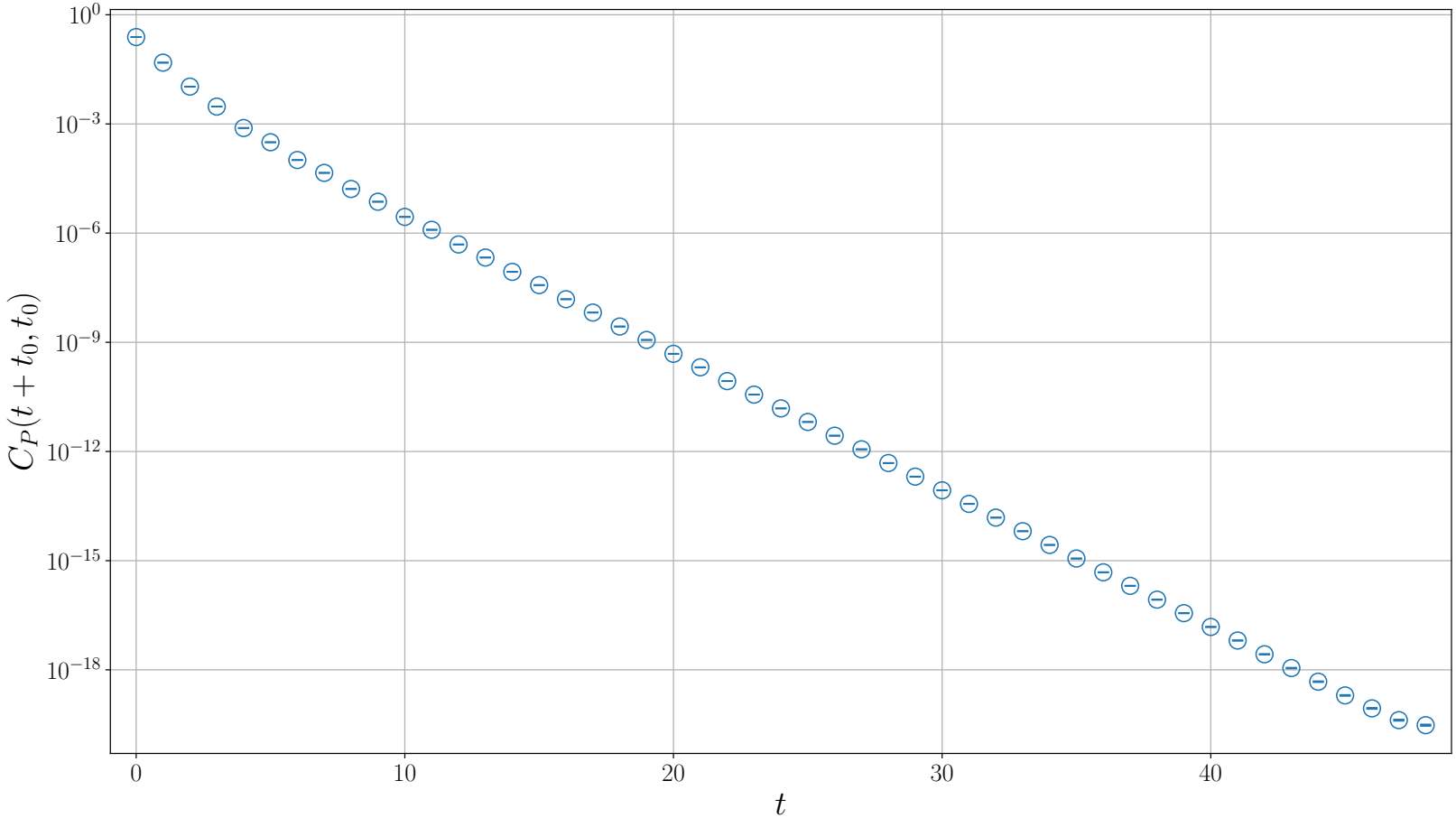
$$\left\langle 0 \middle| A_\mu \middle| H_{(s)}(p) \right\rangle \equiv p_\mu f_{H_{(s)}},$$

$$\left\langle 0 \middle| V_\mu \middle| H^*_{(s)}(p) \right\rangle \equiv M_{H_{(s)}} f_{H^*_{(s)}} \epsilon_\mu(p),$$

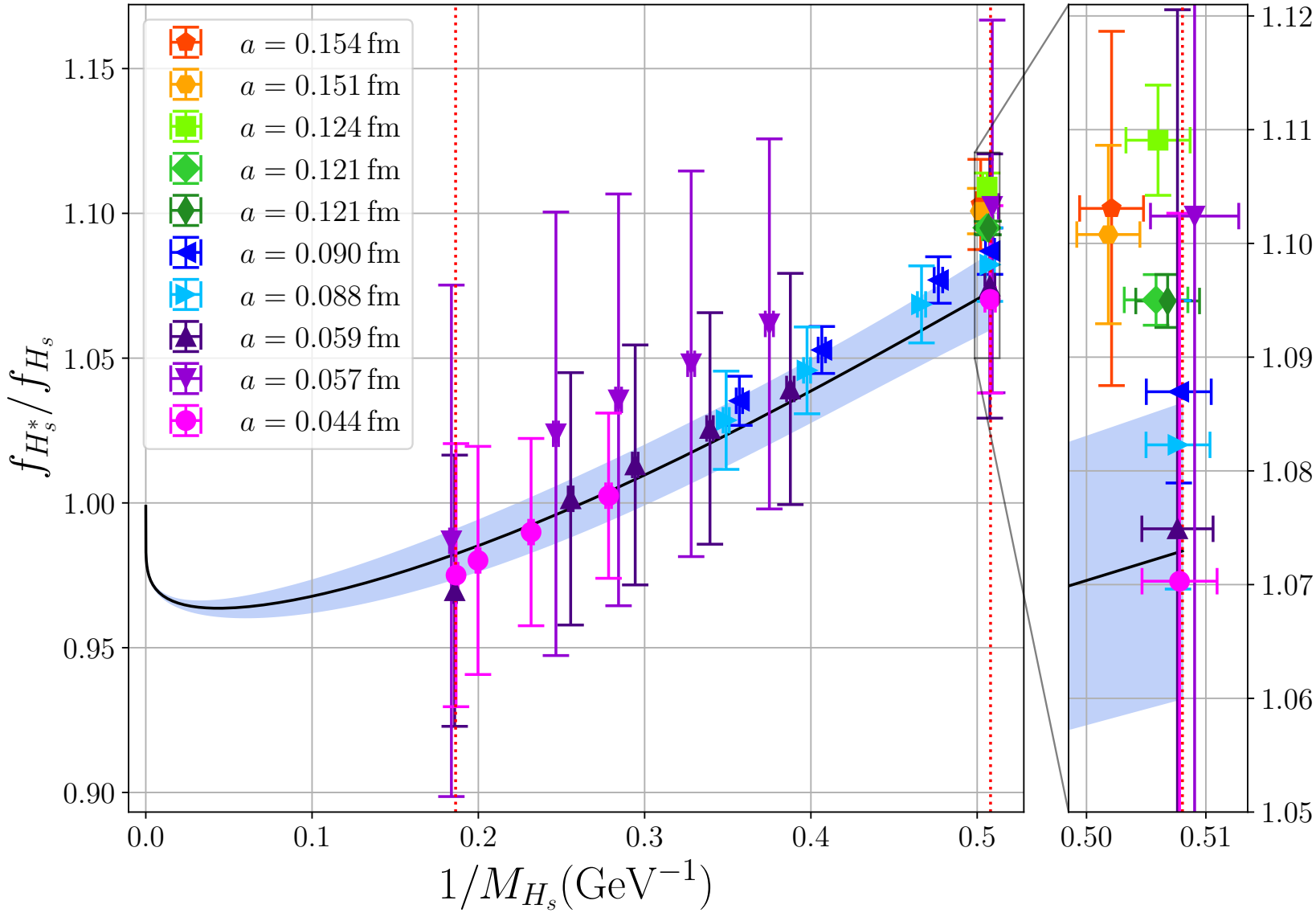
$$\left\langle 0 \middle| Z_T^{\overline{\rm MS}}\, T_{\alpha\beta} \middle| H^*_{(s)}(p) \right\rangle \equiv i f^T_{H^*_{(s)}} (\epsilon_\alpha p_\beta - \epsilon_\beta p_\alpha),$$

Lattice

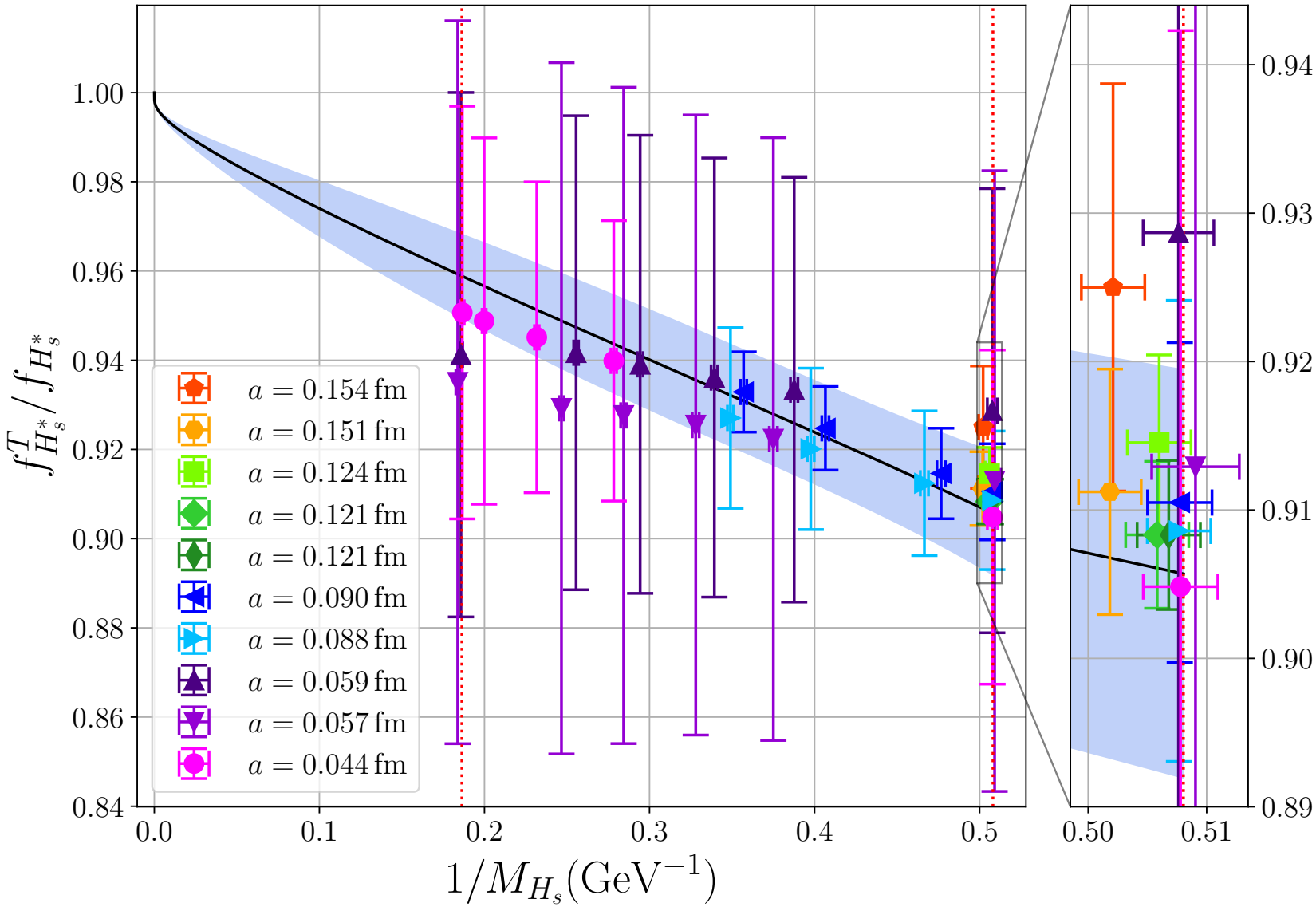

a
t_0
t_1
t_2
t_3
x, y, z
t


10^{0}
10^{-3}
10^{-6}
10^{-9}
10^{-12}
10^{-15}
10^{-18}
$C_P(t+t_0,t_0)$
0
10
20
30
40
t

Results


$a = 0.154\,\mathrm{fm}$
$a = 0.151\,\mathrm{fm}$
$a = 0.124\,\mathrm{fm}$
$a = 0.121\,\mathrm{fm}$
$a = 0.121\,\mathrm{fm}$
$a = 0.090\,\mathrm{fm}$
$a = 0.088\,\mathrm{fm}$
$a = 0.059\,\mathrm{fm}$
$a = 0.057\,\mathrm{fm}$
$a = 0.044\,\mathrm{fm}$
$f_{H_s^*}/f_{H_s}$
$1/M_{H_s}(\mathrm{GeV}^{-1})$
0.90
0.95
1.00
1.05
1.10
1.15
0.0
0.1
0.2
0.3
0.4
0.5
1.05
1.06
1.07
1.08
1.09
1.10
1.11
1.12
0.50
0.51

Results


$f^T_{H^*_s}/f_{H^*_s}$
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
0.0
0.1
0.2
0.3
0.4
0.5
0.50
0.51
0.94
0.93
0.92
0.91
0.90
0.89
$1/M_{H_s}(\mathrm{GeV}^{-1})$
$a = 0.154\,\mathrm{fm}$
$a = 0.151\,\mathrm{fm}$
$a = 0.124\,\mathrm{fm}$
$a = 0.121\,\mathrm{fm}$
$a = 0.121\,\mathrm{fm}$
$a = 0.090\,\mathrm{fm}$
$a = 0.088\,\mathrm{fm}$
$a = 0.059\,\mathrm{fm}$
$a = 0.057\,\mathrm{fm}$
$a = 0.044\,\mathrm{fm}$

That's all folks!

Thank you for your attention!

Please feel free to chat to me about this if you want :)