

# Homotopy Groups of $SU(3)$ , $SU(4)$ and $Sp(2)$

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## §1. Introduction

Let  $\pi_i(G)$  be the  $i$ -th homotopy group of a topological group  $G$ . For  $i \leq 23$  and for  $G = SU(3)$ ,  $SU(4)$ ,  $Sp(2)$ , the groups  $\pi_i(G)$  are computed and the results are given by the following table:

$i =$	3	4	5	6	7	8	9	10	11	12
$\pi_i(SU(3)) \cong$	$Z$	0	$Z$	$Z_6$	0	$Z_{12}$	$Z_3$	$Z_{30}$	$Z_4$	$Z_{60}$
$\pi_i(SU(4)) \cong$	$Z$	0	$Z$	0	$Z$	$Z_{24}$	$Z_2$	$Z_{120} + Z_2$	$Z_4$	$Z_{60}$
$\pi_i(Sp(2)) \cong$	$Z$	$Z_2$	$Z_2$	0	$Z$	0	0	$Z_{120}$	$Z_2$	$Z_2 + Z_2$
$i =$	13	14	15	16		17	18			
$\pi_i(SU(3)) \cong$	$Z_6$	$Z_{84} + Z_2$	$Z_{36}$	$Z_{252} + Z_6$		$Z_{30} + Z_2$	$Z_{30} + Z_6$			
$\pi_i(SU(4)) \cong$	$Z_4$	$Z_{1680} + Z_2$	$Z_{72} + Z_2$	$Z_{304} + Z_2 + Z_2 + Z_2$ $+ Z_2$		$Z_{40} + Z_2 + Z_2$ $+ Z_2$	$Z_{2520} + Z_{12} + Z_2$			
$\pi_i(Sp(2)) \cong$	$Z_4 + Z_2$	$Z_{1680}$	$Z_2$	$Z_2 + Z_2$		$Z_{40}$	$Z_{2520} + Z_2$			
$i =$	19	20	21	22		23				
$\pi_i(SU(3)) \cong$	$Z_{12} + Z_6$	$Z_{60} + Z_6$	$Z_6$	$Z_{66} + Z_2$		$Z_{12} + Z_2$				
$\pi_i(SU(4)) \cong$	$Z_{12} + Z_2$	$Z_{60} + Z_2$	$Z_{16} + Z_2$	$Z_{2640} + Z_4 + Z_2 + Z_2$		$Z_{24} + Z_2 + Z_2 + Z_2 + Z_2$				
$\pi_i(Sp(2)) \cong$	$Z_2 + Z_2$	$Z_2 + Z_2 + Z_2$	$Z_{32} + Z_2$	$Z_{5280} + Z_2 + Z_2$		$Z_2 + Z_2 + Z_2$				

These results are stated in Theorems 4.1, 5.1, 6.1, in which generators of the 2-primary components are given. The computations will be done by use of the homotopy exact sequences associated with the bundles  $SU(3)/SU(2) = S^3$ ,  $Sp(2)/Sp(1) = S^7$  and  $SU(4)/SU(2) = S^5 \times S^7$  and the results [7], [3] on the homotopy